

**IDAHO GEOGRAPHIC INFORMATION ADVISORY COMMITTEE**

**1994 ANNUAL REPORT**

**Hal N. Anderson, Chairman  
Idaho Department of Water Resources**

August 23, 1805 [near North Fork, Idaho]: He therefore determined to abandon this route, returned to the upper part of the last creek he had passed, and reaching it an hour after dark, camped for the night. On this creek he had seen in the morning an Indian road coming in from the north. Disappointed in finding a route by water, Captain Clark now questioned his guide more particularly as to the direction of his road, which he seemed to understand perfectly. He drew a map on the sand, and represented this road, as well as that passed yesterday on Berry creek... After a great deal of conversation, or rather signs, and a second and more particular map from his guide, Captain Clark felt persuaded that his guide knew of a road from the Shoshonee village they had left to the great river to the north...

About this Report: This report was produced to satisfy the requirement in Executive Order 92-24 for an annual report to the Governor of the Idaho Geographic Information Advisory Committee's activities. This report is also designed to be a resource and informational document for all who are interested in or use mapping technologies. Sheldon Bluestein prepared this report. He wishes to acknowledge his debt to Wayne Valentine for showing the way; to express his sincere thanks to all those members of Idaho's mapping community who contributed to this report; and to apologize in advance for any errors or omissions.

About the Cover: Linda Davis of the Idaho Department of Water Resources prepared the cover map of Idaho watershed areas. It shows fourth field watersheds (thick black lines), fifth field watersheds (thick gray lines), and streams (thin black lines). For more information, see the Watershed Subcommittee report on page 61. Thanks, Linda!

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## **Chairman's Message**

by Hal N. Anderson, Department of Water Resources

The Idaho Geographic Information Advisory Committee's year 1994 was a mixed bag of mapping and GIS related activities. We continue to see a reduction in the U.S. Geological Survey National Mapping Division programs. This reduction means that the 200 or so substandard maps and the hundreds of 1:24,000 topographic maps in need of revision will not be completed until well after the year 2000.

Currently, there seems to be very little agreement at the national level as to the where, what, when and how of the national mapping programs. The political climate is also compounding this problem due to disagreement between the executive and legislative branches relative to roles and priorities of the federal government.

These issues will probably not be resolved any time soon. It does seem pretty clear, though, that state and local government and industry will have to take a much larger role in mapping efforts. This is going to require a significant amount of effort, funding and coordination. It also significantly increases the importance of IGIAC.

As we move into 1995, the direction and priorities for IGIAC need to be well defined given changing government roles. The executive order which established IGIAC is very clear about what we are to do. How we get there, however, is our challenge for the future.

In discussions with and exposure to the other states, Idaho has some unique advantages. Our biggest advantage is that we are small. The sheer size and complexity of some state governments and their mapping/GIS programs is overwhelming. Our biggest disadvantage is a lack of dedicated support for cooperative mapping and coordination. Currently, most states have some type of funded organization or body that provides for coordination. They also dedicate funding for mapping programs. A challenge for IGIAC will be to pursue funding support for cooperative GIS projects, coordination, mapping efforts and a State Resident Cartographer.

The IGIAC annual meeting this year was a tremendous success. A record crowd of nearly 100 people attended the two and one-half day event. The conference was held at the National Interagency Fire Center in Boise, which is a first rate facility.

A couple of big success stories this year for IGIAC are the watershed boundary map and the NSDI Metadata proposal. Both of these subjects are detailed in the report but are truly worth mentioning again. A special thanks is in order to all who worked so hard to make those efforts happen.

In summary, between the political and technological changes transpiring in 1994 at times, it was not clear as whether to fish or cut bait. Several things this year were significantly reinforced to me. One is the increased need for regional, state and local mapping programs. Secondly, how important the IGIAC role of communication and coordination is for these programs to be successful.

Finally, I would like to personally thank all the subcommittee chairmen and members for their hard

work and support. This is where the real IGIAC work gets done. Also, a special thanks to Wayne Valentine and Sheldon Bluestein. Wayne was our State Resident Cartographer but decided that retirement was a lot more fun than working. Thanks Wayne, we will miss you! Sheldon has been acting as the State Cartographer since June, 1995 and put together this annual report. I would have been in a heap of trouble without Sheldon's help.

There is always a tremendous need for your help with IGIAC. If you would like to help, please give me a call at (208) 327-7888.

## **EXECUTIVE SUMMARY**

In 1994, the Idaho Geographic Information Advisory Committee (IGIAC) held its annual meeting. It was attended by representatives of federal, state, and local agencies and private firms interested in mapping. The committee heard reports from subcommittees and individuals, and affirmed recommendations to agencies involved in mapping and digital data collection activities.

In addition, IGIAC voting members and subcommittees met throughout the year. New standards and policies on metadata, global positioning systems (GPS), and map projections were adopted after long periods of work. These standards and policies are contained in this report, as are updated status maps of several mapping activities.

Highlights of recent IGIAC activities follow:

1. Use of geographic information systems (GIS) continues to increase in Idaho. As more and more users emerge, there is both an increased demand for standardized "off the shelf" data, and an increased chance that mapping entities will duplicate each others' work. For this reason, metadata (data about data), data sharing, and cooperative data capture were major concerns in 1994. The IGIAC Metadata Subcommittee was very active in 1994; its Report and its newly approved Standard are contained in this Report.
2. In recognition of the importance of metadata, the IGIAC Metadata Subcommittee submitted a proposal for National Spatial Data Infrastructure funds to train Idaho mappers to use Idaho's data dictionary, and to give them incentives to document their data. This \$25,000 proposal was funded in July 1995.
3. IGIAC now has two regional subcommittees, representing northern and southeastern Idaho; these subcommittees will help communications between mappers in Idaho, and will provide critical day-to-day coordination;
4. A major example of cooperation was the creation of a standardized Idaho watersheds map (on the cover of this Report); this map was the result of work by IGIAC's Watersheds Subcommittee, composed of eight different state and federal agencies.
5. The Idaho Department of Lands, which needs a geographic database of large areas of Idaho,

continues its pioneering efforts to synthesize both U.S. Geological Survey and U.S. Forest Service digital maps; a report on IDL activities is contained in this Report.

6. Idaho's U.S. Geological Survey 1:24,000 quadrangle maps continue to age, with very few updated in 1994, and no further updates planned--an issue of great concern to IGIAC members; this topic is discussed in this Report.

7. Cooperation in digital orthophotoquad production continues; reports and maps on the Southwest Idaho Orthophoto Cooperative and on Bureau of Land Management orthophotoquad acquisition are contained in this Report.

9. Data distribution and exchange continue to occupy a great amount of time at the Idaho state agencies which are most active in GIS. IGIAC, these agencies, and users who desire data are all interested in the concept of a state geographic information clearinghouse, which could accept and distribute digital map data.

10. A new chapter of URISA, a national organization of computer mappers, has formed in Idaho; this organization's focus on individual professional growth complements IGIAC's emphasis on agency activities.

11. The Idaho Transportation Department completed its multi-year Digital Line Graph cooperative program, giving it complete DLG coverage of Idaho's highway system.

12. The Resource Grade Global Positioning Systems standard is now complete, and has been accepted by IGIAC; it, and the report of the GPS Subcommittee, is contained in this Report.

13. IGIAC remains concerned about resolution, aerial photo scale, and the high costs of orthophotoquads resulting from Federal decisions about them; a discussion of these issues is in this Report.

14. IGIAC strongly desires to establish a full-time State Resident Cartographer position. Given the volume and complexity of GIS and mapping activities going on in the state, the limited effort the all-volunteer IGIAC can dedicate is not adequate.

This Report begins with IGIAC organizational matters; moves to small, medium, and large scale mapping activities; continues with aerial photography issues; discusses many miscellaneous mapping topics; presents IGIAC recommendations to federal and state agencies; and concludes with appendices of standards, policies, and indexes.

**The tentative date for the 1995 Annual Meeting is November 6, 7, and 8,  
at the National Interagency Fire Center in Boise!**

## ABOUT IGIAC

During the 1970's and 1980's, Idaho's State Mapping Advisory Council (SMAC) provided a yearly forum for state and federal agencies to exchange news about their work. Also, SMAC advised the US Geological Survey about which topographic maps were in greatest need of completion or revision, and helped members efficiently plan aerial photography. In those dark, pre-digital ages, SMAC meetings were attended by a dozen or so people.

With the rise of geographic information systems and remote sensing, the pace of mapping activity increased. SMAC became the Idaho Geographic Information Advisory Committee (IGIAC) in 1988; IGIAC was continued by Executive Order No. 92-24, issued on November 13, 1992. This order designated voting membership as the Departments of Transportation, Water Resources, Fish and Game, Parks and Recreation, Lands, Division of Environmental Quality, Tax Commission, and the Division of Financial Management. Nonvoting membership is open to federal agencies, industrial and professional organizations, and academic institutions.

Under this Order, IGIAC's responsibilities are to:

1. advise the Governor on geographic information issues;
2. review new geographic information, mapping, global positioning systems, and remote sensing technology applications that might benefit the state's interests;
3. make recommendations to state and federal agencies regarding geographic information systems, mapping programs, global positioning systems, and remote sensing;
4. assist in the preparation of requests to appropriate federal agencies as a part of the diversified national mapping program; and
5. meet on at least an annual basis to review geographic information programs, and make recommendations for cooperation and resource sharing.

The Order allows IGIAC to appoint subcommittees as needed, and requires that IGIAC submit an annual report to the Governor.

This Executive Order also says that the IDWR should manage the Idaho Geographical Information Center (IGIC) in accordance with the geographic information policy of IGIAC. IGIC should:

1. provide operational, management, and technical assistance to state agencies and other users of geographic information;
2. cooperate with, receive, and expend funds from other sources for the continued development and use of geographic information;
3. cooperate with Idaho universities and other research institutions for the development and implementation of geographic information capabilities;
4. coordinate efforts among state and federal agencies and private organizations for the establishment and development of a clearing-house for the collection, cataloging, and dissemination of remote sensing data and digital geographic information.

## 1994 IGIAC MEETINGS

From time to time, IGIAC voting members meet to discuss and decide issues. In 1994, IGIAC members met three times in addition to the Annual Meeting.

January 28, 1994: The voting board did the following:

1. adopted the Metadata Standard, and discussed ways to encourage participation;
2. discussed the issue of local/regional interest groups;
3. reviewed subcommittee missions and assignments; and
4. discussed the need for a newsletter.

June 7, 1994: The voting board did the following:

1. discussed the draft Global Positioning Systems (GPS) Standard;
2. discussed the Metadata Standard; members agreed it needed version numbers;
3. received a progress report on watershed mapping;
4. was briefed on and discussed the Idaho Transverse Mercator projection proposal;
5. discussed the status of the A-16 program; approved recommendations for revision of U.S. Geological Survey topographic maps; and
6. discussed a proposed Idaho Department of Lands pricing policy for digital information.

August 30, 1994: The voting board did the following:

1. further discussed the Idaho Transverse Mercator proposal;
2. received a status report on the IGIAC Annual Meeting agenda, date, and location;
3. were briefed on the watershed mapping effort;
4. discussed the GPS standard; and
5. set the time and place, and wrote a tentative agenda, for the Annual Meeting.

October 12, 1994: The voting board met, two weeks before the Annual Meeting, and:

1. formally recognized the Eastern Idaho Users Council, which became the Southeast Idaho Subcommittee of IGIAC;
2. accepted the Idaho Transverse Mercator (IDTM) as IGIAC's recommended all-Idaho map projection;
3. formally adopted the GPS Standard;
4. finalized the agenda for the Annual Meeting; and
5. appointed subcommittee chairpersons.

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### ***1994 IGIAC Subcommittees***

IGIAC has seven subcommittees that focus on specific topics and areas of interest. They are:

1. 24K Subcommittee, concerned primarily with 1:24,000 scale digital mapping, from USGS DLGs, Forest Service CFFs, and other sources, chaired during 1994 by Andy Little;
2. 100K Subcommittee, focussed primarily with 1:100,000 scale digital mapping, from USGS DLGs and Census Bureau TIGER files, chaired during 1994 by Tony Morse;

3. Metadata Subcommittee, concerned with developing metadata--data about data--standards for Idaho, and with documenting differences between the Idaho standards and the emerging federal standards, chaired during 1994 by Bob Harmon;
4. GPS Subcommittee, focussed on applications and technology of global positioning systems, and on developing standards for acquiring and exchanging this data, chaired during 1994 by John Courtright;
5. Watershed Subcommittee, formed to create a common watershed boundary delineation for use by state, federal, and local governments, and by private industry, in managing natural resources, chaired by Hal Anderson;
6. Eastern Idaho Subcommittee, providing a meeting point for mappers in the Pocatello-Idaho Falls-Eastern Idaho region, who cannot attend IGIAC meetings in Boise, chaired during 1994 by Luke White and Dennis Hill; and
7. Northern Idaho Subcommittee, providing the same function for mappers in the Coeur d'Alene-North Idaho region, formally established in February 1995, chaired by Randall Sounhein.

### **IGIAC Regional Subcommittee Activities**

The new South East Idaho Subcommittee's (SEIGIAC) meetings are attended by from ten to twenty persons. Members come from a wide range of users: urban, natural resources, and governmental. The subcommittee rotates to various locations around the southeast region to insure maximum exposure in terms of geography and interests.

Because members use many different systems, SEIGIAC is software neutral. Training is a key item on their agenda. Activities in early 1995 included:

1. meeting in Idaho Falls, hosted by Janet Cheney, with tour of Bonneville County's Intergraph GIS installation, including the E-911 dispatch center; and
2. meeting at Caribou National Forest, hosted by Kim Chipman; with presentations by Bart Butterfield of Idaho Fish and Game on GIS applications, Russ McFarling of Bureau of Land Management on GPS techniques, Dennis Dehuren of Caribou Forest on GIS applications, and by Chris Powell of Bonneville Blueprint on scanning technologies.

The Northern Idaho Subcommittee (NIGIAC) grew from an informal GIS Users' Group in Coeur d'Alene, which has been active over the past five years. Activities in 1994 included:

1. meetings to exchange information (see page 34 for information on individual member reports); and
2. a Memorandum of Understanding between the Idaho Panhandle National Forest, the Idaho Department of Lands, Idaho Fish and Game, U.S. Fish and Wildlife Service, the Coeur d'Alene and Kootenai Tribes, and the Natural Resource Conservation Service--regarding a common vision for implementing ecosystem management within the Panhandle region.

NIGIAC members and the Spokane GIS community will co-host the Northwest ARC/INFO Users' Conference at the Coeur d'Alene Resort in Coeur d'Alene, on October 22-26, 1995.

## 1994 IGIAC ANNUAL MEETING REPORT

The Annual Meeting was held on October 26 through 28, 1994, at the National Interagency Fire Center in Boise. (Thanks to NIFC!) It was attended by 98 people during its three days (see attendance list in Appendix D, page 97). Here is the agenda:

### Wednesday, October 26:

1:00 PM	Welcome and introductions	Hal Anderson
1:30	NSGIC - report on objectives and progress	Hal Anderson
2:30	US Geological Survey report	Ingrid Landgraf and colleagues
3:00	Break	
3:30	USGS report continued	
4:30	Adjourn	

### Thursday, October 27:

8:30 AM	Cartographic base and Cadastral mapping (analog and digital)	Agency reports: Federal, State, Tribal County, City, Industrial
10:00	Break	
10:30	North Idaho IGIAC Subcommittee	Randall Sounhein
11:00	Orthophotography projects	Agency reports
11:45	Lunch break; working lunch for 24K, 100K, and Metadata subcommittees	
1:30 PM	Thematic mapping and GIS activities (including fire)	Agency reports
3:00	Break	
3:30	Thematic mapping and GIS, continued	
4:30	Adjourn	

### Friday, October 28:

8:30	Aerial photography projects	Agency reports
9:00	URISA chapter report	Diane Halloran
9:30	Eastern Idaho IGIAC Subcommittee	Luke White
10:00	Break	
10:30	24K Subcommittee report	Andy Little
11:00	100K Subcommittee report	Tony Morse
11:30	GPS Subcommittee report	John Courtright
12:00	Lunch	
1:30	Watershed Subcommittee report	Hal Anderson
2:30	Metadata Subcommittee report	Bob Harmon
3:00	Break	
3:30	Open discussion	Hal Anderson

4:30

Adjourn

## **1:100,000 SUBCOMMITTEE NEWS**

by Tony Morse, Idaho Department of Water Resources

Activities on the 100K (1:100,000 scale) front centered on finishing the enhancements and corrections to the digital hydrography, and on correcting public land survey (PLSS) coverages.

Hydrography: An enormous amount of work has been done on hydrography by the Department of Water Resources (IDWR) and Idaho Department of Fish and Game (IDFG). This has resulted in a coverage which will be finished and available from USGS Portland by Spring, 1995. DWR has repaired the arcs in the 1:100,000 hydrography, and the coverage is now complete. All arcs have been arranged to point down-stream, the coverage is set up for analysis with NETWORK, and the major and minor codes have been corrected where necessary.

IDFG has enhanced the coverage by adding river reach numbers and stream names. The names that appear on the 1:100,000 quad have been included. Stream names have also been added from the geographic name database. IDFG has updated their IRIS (Idaho Rivers Information System) with the river reach numbers so that the information in IRIS can be used with the enhanced 100K hydrography. This coverage is available in a two file format. One file has center lines of all streams; the other file has polygons of lakes and wide rivers.

Fish and Game GIS:

The Idaho Department of Fish and Game is assembling a GIS at 100K scale. Details are on page 13.

BLM Recreation Maps

The Bureau of Land Management is releasing maps in a new recreation series, at a scale of 1:168,960 (see map on page 15). These are attractive maps which, added to Forest Service maps, will give almost complete coverage of recreation opportunities in Idaho's wildlands.

PLSS

The 100K DLG PLSS layers have been repaired enough to be able to build topology, but no systematic checking has been done for edge matching. Some errors have also been found in the 24K PLSS data. Since some of the 100K data were taken from the 24K, it is likely that those errors are also in the 100K data. An attempt was made to report errors in the USGS's 100K PLSS layer for the Rexburg quadrangle. To date, no concrete reaction has come from the USGS, and a coverage with reported errors continues to be available.

The USGS has not yet announced availability of the PLSS layer for the Coeur d'Alene 100K map (map, page 17). IDWR has created this layer, and it is available from them.

The Idaho Geological Survey (IGS) continues working on its statewide 1:100,000 geologic database

(see map, page 16). Geologic maps are digitized at their original scale (and saved at this scale), and then generalized as needed for the 100K series. The Nez Perce and Clearwater National Forests want these geologic layers, and agreements are being developed with them.

## **DEPARTMENT OF FISH AND GAME BUILDS 100K GIS DATABASE**

By Bart Butterfield, IDFG

The Idaho Department of Fish and Game (IDFG) routinely collects data on the distribution, abundance, and recreational use of Idaho fish and wildlife. Most of this data is collected and maintained by regional offices, in forms in which vary from office to office. This lack of central data organization results in inefficiency in data recall and an inability to perform comprehensive and historical analyses. Ultimately, institutional knowledge may be lost as personnel transfer or retire.

IDFG is using its GIS as a catalyst to compile these data into structured digital databases. In addition to creating consistent resource databases, the data will be attached to 1:100,000 scale GIS map layers allowing IDFG personnel to examine their data in relationship to other geographic data. It is expected that the initial databases will be prepared by the end of 1996, with data entry and development of additional data layers continuing into future years. The initially identified fish and wildlife databases and their relationships to GIS map layers are shown below.

## **BLM 100K Ownership map status**

## **New BLM Rec Maps**

## **IGS Geologic Map Status**

### **100K DLG Status**

## 24K SUBCOMMITTEE NEWS

By Andy Little, POWER Engineers/GGI

In 1994, the digital data users group for 1:24,000 (24K) scale data was active in pursuing, separately and cooperatively, resolution to important issues. The group continues to be stable in size, with approximately 60 on the mailing list. A core group centered in Boise continues to provide the majority of the support, direction and work effort. This is not a reflection on the people in Northern and Eastern Idaho, whose participation is highly prized at meetings. The issue of a more statewide approach continues to plague the group. This is simply a problem of geography--the State of Idaho is spread out (which none of us mind)--six degrees in latitude and seven degrees in longitude.

The U.S. Geological Survey (USGS) continues to support our meetings by supplying personnel and information. This is appreciated. One of our continual focuses is to remain current on new products and information from the USGS. Their support primarily comes from the Rocky Mountain Mapping Center (RMMC) in Denver.

We had two meetings in 1994. In summary form the following things happened in those meetings.

### August 17 Meeting--14 people, 11 agencies represented

We received an update from Ken Osborn, Deputy Chief, Mapping Operations USGS RMMC. Ken distributed an updated series of maps showing the status of various Digital Line Graph (DLG) overlays in Idaho. These were current as of 8/12/94, and consisted of Boundaries, PLSS, Transportation, Hydrography, Hypsography, Miscellaneous Culture, Survey Control, Non-vegetation, Digital Elevation Models (DEM's), and Cartographic Feature Files (CFF's).

We had the opportunity to discuss the issue of substandard mapping in Idaho with Ken. Idaho has 1700+ 24K quadrangles, and we consider 200 to be very substandard. The result of this discussion was inconclusive--no definite answers from the USGS spokesperson.

The other issue discussed at this meeting was Stream Indexing for the state. This discussion led to the formation of the Watersheds Subcommittee. Members from this group helped out on the resolution of the Stream Indexing in subsequent meetings of that group.

### October 27 Meeting--24 people, 15 agencies

This meeting was held in conjunction with the annual IGIAC meeting. The thinking here was to have a lunch meeting in close proximity to the annual meeting place in hopes of a good turnout from all the corners of the state. This worked out pretty well, with attendance being the highest in two years. The issues to tackle in that meeting were: State Data Clearinghouse; substandard mapping status; and standardizing file naming conventions.

The Clearinghouse issue consisted of the potential need for a lead agency and who that should be,

metadata for the clearinghouse, and discussion of the grant application for the clearinghouse.

The issue of substandard published 24K quadrangles was discussed at several levels. The USGS simply maintains a master copy of each quad, and marks (or adds stickies near) the reported problems. If Idaho did this, how would the quads be organized, where would they be kept, and would there be a bulletin board for problems and fixes?

The Idaho Department of Lands distributed their file naming convention (see page 28), and discussion followed.

#### Future Issues for 1995

The Subcommittee wants: to have at least two meetings in 1995; to discuss the unresolved issues of 1994; to monitor changes in the DLG standard (from DLG-O to DLG-E to DLG-F); and to continue to get updates from USGS and other agencies producing new or revised quads.

Another concern, very obvious to this soon-to-be-retired subcommittee chairperson, is the absence of Wayne Valentine from the IGIAC. Wayne has been of enormous help in preparing for meetings by helping with the mailing notices, preparing agendas, haranguing the USGS, making arrangements, phone calls, and acquiring information--yet most of all I will miss his great attitude, knowledge, and enthusiasm. Many thanks go from him to me--he will be missed.

## OTHER 24K ACTIVITY

Idaho remained a hotbed of activity concerning 1:24,000 scale quadrangle maps. These maps (called "quad maps" or "topo maps"), originally the premiere product of the U.S. Geological Survey (USGS), were completed for Idaho in their paper format a few years ago. Today, attention focusses on five issues:

1. revision of out-of-date or inaccurate paper maps;
2. conversion of paper 24K maps to digital format;
3. emergence of a new standard, developed by the U.S. Forest Service, which complements and challenges the USGS standard;
4. incorporation of Bureau of Land Management Geographic Coordinate Data Base (GCDB) material into the USGS/Forest Service digital products; and
5. completion of 24K Digital Elevation Models (DEM's) for the entire state.

### **Revision of Paper 24K Quadrangle Maps**

In the past, a major function of IGIAC was to recommend to the USGS priorities for completion or revision of 1:24,000 scale quadrangle maps. In the 1993 IGIAC Annual Report, an eloquent, well-reasoned plea was made for the USGS to establish a systematic program to revise these maps. Wayne Valentine estimated that some seventyfive 24K maps in non-Forest Service areas should be revised each year.

Why this urgent need to revise quad maps? Many maps in urban, near-urban, timber, and even farm lands are quite out of date. Also, other maps were not completed to National Map Accuracy Standards, or were produced using technologically obsolete methods; these, too, must be revised or replaced.

Problems with inaccurate paper maps have impacts on digital mapping. USGS Digital Line Graphs (DLG's; see below) are based on published paper maps. If the paper maps (which include publication dates and accuracy statements) are old or inaccurate, the resulting DLGs will be flawed. Further, DLG users may not realize that their digital maps are based on flawed paper products.

In 1993, as in years past, this Report included a list of maps needing revision, with various levels of priority (1993 Annual Report, pages 90-94). In this Report, the same map used in 1993 is included (see page 33); however, the list is not.

The results of IGIAC's recommendations have been disappointing. The USGS was planning to revise thirty Idaho 24K maps this year, in the Priest Lake and Burley areas--maps to which IGIAC had assigned second- and third-level priorities. However, even these plans have now been scrapped; no Idaho 24K maps are formally planned for revision.

Ingrid Landgraf of the USGS states that this change reflects pressures from the rapidly approaching 2000 census. The Census Bureau will soon require complete, current digital coverage of the entire country. This priority has "bumped" Priest Lake and Burley, and focussed USGS attention on large urban areas such as Phoenix and Sacramento. It is possible that the USGS may revise the Ada and

Canyon county quadrangles before the census--but even that seems unlikely. Thus, for another five years, it seems that there will be no revisions of USGS 24K quadrangle maps.

### **DLG Status Reports**

In the past, if you said "digital 24K base map", you were almost certainly speaking of USGS Digital Line Graphs (DLG's). These were digitized from published maps, and included all the USGS map symbology. They are topologically structured and include both line and area codes.

USGS DLG's remain highly sought after. Coverage of the key hydrography, Public Land Survey System (PLSS, the township-range-and-section lines), transportation, and boundaries layers are shown on pages 23 through 25.

Several Idaho agencies have cooperated with the USGS to produce DLG's. The Idaho Transportation Department (ITD) just concluded an eight year project to produce DLG's for the entire State highway system. The Bureau of Land Management (BLM) also has a Memorandum of Understanding with the USGS regarding the exchange of DLG work for orthophotoquads.

### **CFF News**

The U.S. Forest Service was an early advocate of 24K maps. It developed a regular update program for its paper 1:24,000 Primary Base Maps. Thus, it was a prime candidate for digital conversion. The digital product it developed was called the Cartographic Feature File (CFF).

Like DLG's, CFF's are 24K digital maps. However, CFF's differ from DLG's in several key aspects:

1. CFF's are based on updated material developed by the Forest Service (usually from photogrammetric mapping), and are usually more current than DLG's;
2. CFF's are built in a single layer, not multiple layers as with the DLG's;
3. CFF's include many cultural features not included in DLG's, such as campgrounds and gates, and horizontal and vertical control points;
4. CFF's have excellent edge matching between quads, because they are digitized as project areas, not one quad at a time;
5. CFF's only contain line attributes--there are no polygon attributes; and
6. CFF feature attribute codes consists of a three digit code, in contrast to DLG's which have an indefinite number of major/minor codes.

The Idaho Department of Lands' Technical Services Section has been a national leader in resolving differences between DLG's and CFF's. A one page summary of their efforts is on page 27. A map of their Common Database coverage, which is based on both DLG's and CFF's, is on page 29. And, their method of indexing 24K coverages is on page 28.

Also, the State Tax Commission (STC) is developing an agreement with IDL to create a statewide 24K digital base map. The STC is assisting in quality control on the IDL 24K quads. The STC will use the resulting base map for their tax code area maps, which show boundaries of taxing districts such as school districts, fire districts, counties, hospital districts, and cities.

### **GCDB Incorporated into DLG Format**

The BLM's Geographic Coordinate Data Base (GCDB) program has developed coordinates for most of Idaho's PLSS corners, down to the quarterquarter section ("forty") and government lot level. These coordinates have been based on original survey records, geodetic control information (where available), and digitized "found corners" on USGS quadrangle maps.

In GCDB, sections are broken down according to the BLM Manual of Surveying Instructions, and government lots and tracts use actual metes and bounds along rivers and around many mineral surveys. A map of GCDB progress is on page 69.

The Idaho Department of Lands is incorporating the GCDB corners into its GIS. It will use the GCDB depiction instead of CFF or DLG PLSS layers. This is another example of pioneering work from State Lands, and the rest of America's mapping community is following: when GCDB is complete in three to five years, it will become the official PLSS layer for all Federal mapping, including that of the USGS.

### **Idaho DEM Coverage Almost Complete**

Two types of digital elevation information have been available for Idaho. "DMA data" came from the Defense Mapping Agency, and was based on the 200-foot contours on their 1:250,000 scale maps. Although it was not as precise as many wanted, it covered the entire state, and the data files were of a manageable size.

DEM's come from contours on USGS 24K quadrangle maps. Their precision allows detailed study of elevation, slope, and aspect. However, in the past, they had three main drawbacks:

1. they were available for only a few quadrangles;
2. the data sets were very large, straining mass storage capabilities; and
3. these large data sets also strained computation capabilities.

Now, all three drawbacks are being nullified. DEM coverage for Idaho is almost complete (see map, page 32); storage has become much less expensive than in prior years; and computers, too, have become much more powerful. It is likely that DEM's will be used in more and more GIS models.

## **24K DLG Hydrography**

## **24K DLG Transportation**

**24K DLG PLSS**

### **CFF Status**

## **INTEGRATING CFF'S AND DLG'S AT THE DEPARTMENT OF LANDS: A HYBRID APPROACH TO DATA CONVERSION**

By Dave Gruenhagen, Idaho Department of Lands

The Idaho Department of Lands is developing a 1:24,000 scale GIS database to serve as a decision support tool. The Department administers approximately 2.5 million acres that is distributed across the state of Idaho. Due to the scattered ownership pattern, a database covering most, if not all of the state will be required. Two primary sources for 1:24,000 base category digital data are U.S. Geological Survey (USGS) digital line graphs (DLG's) and U.S. Forest Service (USFS) cartographic feature files (CFF's).

### **CFF Conversion**

CFF's consist explicitly of attributed lines, points, and nodes. Polygon attributes are not collected, and they are not topologically structured. Features in the CFF are attributed using a system developed by the USFS based on USGS cartographic symbol numbers.

A procedure has been developed to convert raw CFF files into ARC/INFO coverages that are attributed for both lines and polygons and are topologically structured. There are two phases to this procedure. The first phase is fully automated and produces ARC/INFO coverages for each primary layer with only line, node, and point attributes.

The second phase assigns attributes to the polygons in layers that require polygon topology (hydrography, PLSS, and boundaries). An operator may be required depending on the particular layer. The PLSS layer is attributed from the 1:100,000 scale DLG's and the other layers have polygon attributes assigned from the line features.

### **Integrating CFF's and DLG's**

In order to build a GIS database from both data sources, a common coding design was developed. The design is based on the three digit CFF coding scheme to create a unique four digit code to describe each feature. The first three digits are the CFF code and the fourth digit is used to describe a DLG attribute that does not translate directly to a CFF code. DLG major/minor codes are translated to the new coding design by a series of programs (AML's) and look-up tables. In addition to assigning new codes from the DLG's, additional line attributes are being added to the coverages to make them compatible with the coverages built from CFF's.

Using the new coding structure in a relational database environment is a simple process, because attributes for lines, nodes, points, and polygons are all included in a common database. An additional benefit is that appropriate map symbology can be assigned to the master look-up table, thus expediting map compilation.

IDL 24K Quadrangle Indexing

## IDL Common Database Status Map

## NRCS Soils Mapping

## F&WS Wetlands Mapping

24K DEM Status

24K Quadrangle Revision Reccs

## LOCAL GOVERNMENT NEWS

### Legislation on Fees for Digital Data

In 1993, Idaho's Legislature passed Idaho Code 31-875, which gave a county "which develops a computerized mapping system" the right to collect fees based on the "actual costs of development, annual maintenance and dissemination" of the system. This applies to digital data only; paper copies continue to be charged for at the direct cost of reproduction.

The 1995 Legislature, using almost identical language, extended this concept to Idaho's cities. See Idaho Code 50-345 for the new city law.

### State Tax Commission

Luciel Vincent is now managing three mappers. Rose Blazicevich continues to map taxing district boundaries, working in close cooperation with city, county, and other local governments. She and Lawrence Wasden, Deputy Attorney General, met with many city clerks and reviewed requirements for reporting changes in city limits. This will result in more accurate city maps.

Hall Guttormsen has succeeded Sheldon Bluestein as State Mapping Coordinator, providing assistance to county assessors on parcel mapping, deed processing, computer mapping, and aerial photography. Joe Bucher holds a new Senior GIS Analyst position. Joe is assisting both Rose and Hall.

Efforts are underway to prepare a basic mapping course for the counties throughout the state that introduces federal and state survey requirements, laws, and mapping tools to assist the county assessors. This will be presented in August and a subsequent course requiring a deeper comprehension into these same areas in January 1996.

### NIGIAC area

In the North Idaho subcommittee area, the Panhandle Health District (PHD) continues to update its Rathdrum Prairie Aquifer data base, adding quarterly sampling results to its well coverage. PHD is finalized their Critical Materials database which has been linked from their Novell PC network to their Sun NFS network via PC-NFS and Arcview2. This allows non-GIS users access to pertinent spatial information.

PHD has completed their Solid Waste routing/transfer GIS application for the five northern counties. PHD is also working with DEQ to develop GIS coverages for the Priest Lake Management Study. They are currently working on erosion, land use and stormwater coverages. Lattices and analytical hillshades via GRID have been developed for surface analysis. All groundwater and surface water information is also being incorporated into the GIS.

The Kootenai Electric Cooperative service area covers four counties: Kootenai, Benewah, Bonner, and Spokane. Tyson Taylor is now handling their GIS program. A three-phase GIS project started with

conversion of hardcopy maps (which needed revision) to digital form; a massive GPS data capture project of an estimated 5000 account locations; and installation of an ARC/INFO based Distribution Analysis package developed by Envision Utility Cooperative of Santa Fe, NM. Kootenai Electric is producing digital field maps to replace the old analog "truck maps". They are also using Electric GIS (from Envision), an ARC/INFO-based package. Other projects for the future include real time GPS, outage reporting, system inventories, Oracle, etc.

Kootenai County has established a GIS Committee of the Assessor's Office, Planning and Zoning, and the Information Services Department. This Committee is overseeing development of a common base map. For 911 and other purposes, a county road map was created using resource-grade GPS; this will be used with NETWORK to help emergency dispatching. Scanned Assessor's parcel maps and aerial photos are being joined to produce a quick map for zoning and other applications. A new survey-grade GPS system will be used to accurately locate PLSS and subdivision corners. The county has adopted a fee schedule for digital map data; the fee is \$55 per megabyte of data.

The Idaho Panhandle National Forest is using GIS in grizzly bear cumulative effects modeling, and in studies of the Bunker Hill superfund site.

The Coeur d'Alene Tribe has compiled 154 24K quadrangle maps for their base map, and have begun the QA/QC process. Their base layer includes: Hydrography, Transportation, and PLSS. Other layers used by the Tribe include endangered species, wetlands, county ownership, road update using SPOT imagery, and a variety of plant, soil, and animal collection sites for the Coeur d'Alene Natural Resource Damage Assessment.

The Bonner County Assessor's Office has converted 55% of its ink-on-mylar plat maps to digital form using CAD; completion of the parcel map is scheduled for early 1996. Some appraisal applications are already being made. Planning and Zoning has Atlas GIS, and is working with Panhandle Health Department to use the Assessor's maps for P&Z and other purposes.

Many government agencies in the Lewiston area joined with the Corps of Engineers to fly the Lewiston impact area at 1:1200; Corps of Engineers control was used where available. The flight was done in March of 1995. The Corps is producing an initial digital base map with some 34 layers; delivery is expected for Fall 1995. The City of Lewiston has purchased ArcCAD and ArcView software, and is experimenting with applications.

### **ELIGIAC Area News**

In the Eastern Idaho subcommittee area, Bonneville County has created a new GIS Department, presently headed by Janet Cheney. It is maintaining maps for the 911 system, which is completely functional. A parcel database for a large area around Idaho Falls, Iona, and Ammon--where there is a good control network--is being created using data from the Assessor's office and from Idaho Falls city. Links to the Assessor's database are being developed. Intergraph GIS training continues. Dennis Jones has been hired as the county's first full-time County Surveyor; expansion of the control network has been discussed.

### **Southwest Area News**

Canyon County continues to develop its Assessor's parcel map using AutoCad software; over 30% of parcels are now entered. This is being done in-house by Ted Martin, a researcher, and two mappers. Some applications have been done in the Nampa area; maps have been created for the new Comprehensive Plan.

The City of Caldwell is starting a new computer mapping system, using GPS, on-the-ground surveys, new aerial photography, and AutoCad.

Ada County's GIS services have been reorganized, and the GIS office is now under Bob McQuade, the new Assessor. Bob is committed to developing GIS appraisal applications. Scientech, Inc. is continuing with its project to annotate record bearings and distances on unplatted (metes and bounds) parcels. When complete, users will be able to query a parcel boundary line's record measurements, and to ask for a list of a parcel's record measurements. Scientech is also continuing to support Boise city's comprehensive plan and Foothills Plan with twenty-plus layers of information.

The Washington County Assessor's Office has had a long-standing contract with Roland Mullinix, a local surveyor, to produce parcel maps. Early maps were created with ink on film; later maps were created on Generic CAD. The county's parcels are now 50% complete; the early phases concentrated on urban areas, so only easier-to-map rurals remain. While Mullinix continues to create new maps, the Assessor's office is beginning to maintain the existing maps. Lynn Wiggins, County Assessor, is investigating CD-ROM storage and distribution of map and ownership information.

Twin Falls, Jerome, Gooding, and Lincoln Counties continue to investigate E911 services and an associated GIS. They are very close to awarding a contract to create this system.

## URISA NEWS

By Diane Halloran, Ada County Highway District

The Northern Rockies Chapter of URISA (Urban and Regional Information Systems Association) was established in 1993. The chapter encompasses the area of Idaho and eastern Oregon. The goals of the chapter are to:

1. provide an objective educational forum without political, social, financial, or nation bias which will stimulate, encourage, and otherwise provide for the advancement of an interdisciplinary approach to planning, designing and operating urban and regional information systems;
2. foster the exchange of ideas, information, and studies focused on the planning, operation, and consequences of such information systems; and
3. promote professional interaction, stimulate research, encourage publication, and generally aid the advancement of its members and other organizations having related objectives.

Since it was started, the chapter has sponsored two conferences. The first, titled "1994 Northwest Conference on Spatial Data: Guiding the Transition to the Future", was held April 20-22, 1994 at the Boise Center on the Grove in Boise. Approximately 110 people attended this conference. The major objective was to introduce information system professionals in Idaho to the idea that a quality conference could indeed be sponsored and hosted in Idaho. The feedback indicated that it was a 'roaring' success.

The second conference, titled "1995 Northwest Conference on Spatial Data: Integrating Information and Technology: It Makes \$ense", was attended by 80 people. The major goal was to get some seed money in the chapter account, to enable the chapter to sponsor quality training and workshops, as well as pay for some chapter expenses that have been absorbed by various agencies.

Both conferences were successful. Summaries of their agendas follow on pages 39 and 40.

Other activities have included five meetings in Boise and four meetings in the southeastern part of Idaho. Talks have included Terry Bartlett of ESRI speaking about ArcStorm, and Geographic General discussing database design.

The chapter will not sponsor a full three day conference in 1996, since the Northern Rockies Chapter will be helping to produce the URISA national conference in Salt Lake City. For those interesting in attending, there will likely be good deals for those who help before or during the conference. For further information, contact the current chapter president, Dennis Hill, City of Pocatello, 208-234-6230.

In lieu of a full conference, the chapter will likely sponsor several one day workshops or training sessions. These would be in response to two questionnaires that indicate what chapter members want in the way of services and training activities.

The first questionnaire (responded to by 75 conference attendees) gave the following ratings, in order from highest (5 possible) to lowest (1): technical workshops (4.39); training (4.17); user demos (4.17);

vendor demos (3.97); guest speakers (3.96); professional workshops (3.88); poster sessions (3.65); newsletter (3.58); membership guidebook (3.56); and special interest groups (3.44).

The second questionnaire (responded to by 39 members) rated proposed training courses, with two possibilities: "Interested" or "Have or Will Budget For". It also asked questions about times and places for training. Results (in numbers of members desiring the training) were:

	Int'd? Budget?			Int'd? Budget?	
<u>ARC/INFO Courses</u>			<u>URISA Workshops</u>		
Advanced ARC/INFO	6	2	Cartography & Map Design	11	1
AML	9	4	Managing GIS Implementation	11	2
GRID	3	1	Database Design/Data Models	17	3
TIN	4	1	Data Conversion	7	1
COGO	4	-	Hardware & Network Integrate	8	1
ArcStorm	5	2	Introduction to GPS	-	-
ArcScan	3	2	Desktop Mapping	6	1
ARC Database Design	10	4	GIS & Document Imaging	8	-
Dynamic Segmentation	5	3	AM / FM / GIS	4	1
Regions	4	2	Digital Orthophotography	7	1
<u>Other Training</u>			Integrating Remote Sensing/GIS	5	-
System Administration	8	1	Law & Policy of Public Info	3	1
MapInfo	5	-	Multimedia & GIS	5	-
Database Administration	13	4	Technical Trends/Public Safety	2	-
Atlas Graphics	2	-	Consensus Building for GIS	7	4
How to Start a GIS	4	-	Re-engineering Government	6	-
ArcView	2	-	GIS and the Internet	10	-
AutoCad Cartography	1	-			

The 39 respondents thought the best time of year for training was: Winter (21); Fall (9); Spring (8); and Summer (3). Allowed to make multiple selections from a list of "locations to which you would be willing to travel", responses were: Boise/Nampa (27); McCall (21); Sun Valley (20); Twin Falls (19); and Pocatello/Idaho Falls (14). Write-ins were received for Caldwell, Mountain Home, and Ontario.

## **AGENDA FOR NORTHERN ROCKIES CHAPTER URISA'S 1994 CONFERENCE**

### **Wednesday, April 20, 1994:**

- 9:00 Opening address, Cecil Andrus
- 10:00 Panel discussion, "Where is the Future?", with Hal Anderson, S.J. Camarata, Jim Castagneri, Karl Chang, and Doug Merrill, moderated by Tony Morse.
- 12:00 Lunch speaker, Marty Seidenfeld
- 1:30 Workshop by Seidenfeld, "Psychological Skills for Coping with Changing Technology"; papers by: Loudon Stanford and Ruth Vance; George Waddington and Chaur-Fong Chen; Steve Aldridge; Eric Karver; Michael Brock; and by Mike Beaty.
- 3:30 Workshop by Bill Kramber, "Introduction to Remote Sensing"; papers by Phillip Dodds; Steve Serr; Soren Andersen; and by Diane Holloran, Dawn Garrett, and Mike McClenahan.

### **Thursday, April 21:**

- 8:30 Workshop by Rob Spofford, "Introduction to Internet"; papers by: Sheldon Bluestein; Bill Kramber and Tony Morse; Amy Haak and Steve Selvage; and by Mark Seyfried, P.E. O'Neill, and E.T. Engman.
- 10:30 Workshop by Brad McKinley, "Introduction to Net-

working"; papers by Kimberly Dietz and Victoria Wodrich; Toru Otawa, Shae Sanderson, and William Henkel; Ralph Titus; John Courtright; Randy Lee, Julie Brizzee, and Luke White; and by Barbara Kamp, Doug Bergey, and Diane Holloran.

- 1:30 Workshop by Terry Bartlett, "Introduction to GIS"; papers by Ivo Foldyna; Ken Beard; Mark Duenas; David Short; Jerry Knight; and by Dave Spencer and Roger Logan.
- 3:30 Workshop by Bill Cresse, "Introduction to CADD"; papers by White, Brizzee, and Beseris; and by Dennis Hill; Northwest ARC/INFO User Group meeting.
- 6:30 Banquet speaker: Ernest Lombard, "Ghost Towns of Idaho"

### **Friday, April 22:**

- 8:30 Workshop by Kenneth Nealy, "Introduction to GPS"; papers by Mike McClenahan, John Priester, Jeff Servatius, and Chuck Jenkins; Kim Johnson and Amy Haak; Mary McGown; and by Bob Harmon.
- 10:30 Paper by Barbara Schmitz; Northwest URISA Chapter Meeting.

## **AGENDA FOR NORTHERN ROCKIES CHAPTER URISA'S 1995 CONFERENCE**

### Wednesday, April 19, 1995:

- 8:30 Opening Address by Shari Aikens, "Downsizing and the Role of Technology".
- 9:00 Presentation by Barbara Poore, "National Spatial Data Infrastructure/National Geographic Data Clearing-house".
- 9:45 Panel discussion, "Integrating Information and Technology", with Hal Anderson, Kim Johnson, Dawn Garrett, Clair Bowman, and Luke White, moderated by Diane Holloran.
- 10:45 Panel discussion, "Planning and Technology", by Roni Gehring-Pratt, Charles Trainor, Carla Olson, Melody Halstead, Gary Butler, and Dave O'Leary; paper by Erv Olen and Amy Haak; and video demonstration by Gary Grimm.
- 1:30 Workshop, "Managing Communications through Technology", by Steve Leroy; papers by: Ali Bonakdar and Mary Hardison; Tony Morse and Bill Kramber; and by Jody South
- 3:30 Workshop, "Internet", by Rob Spofford; papers by: Ginger Gates; Diane Holloran; and by Andy Little.

### Thursday, April 20:

- 8:30 Workshop, "Introduction to Remote Sensing", by Bill Kramber; papers by Barron Buckingham, Merland Halisky, Dave Spencer; Monte McVay; and by Luke White.
- 10:30 Workshop on "Applications Using Remote Sensing and Image Processing Contributing to a GIS", by Dave Van Mowerik; and workshop on "Introduction to Geodesy", by Gary Perasso.
- 1:30 Workshop, "Digital Orthos"; and workshop, "Global Positioning System", by Mike Siesel
- 3:30 Workshop, "GPS Applications for GIS", by Ken Neely; papers by: Bob Smith; and by Bill DeGroot and Tom Spencer.

### Friday, April 21:

- 8:00 Workshop, "Desktop Mapping: ArcView 2", by Terry Bartlett and Soren Anderson; and IGIAC Subcommittee Meetings.
- 10:30 Meeting of Local ARC/INFO Users Group; Meeting of Northern Rockies Chapter, URISA

## **AERIAL PHOTO AND ORTHOPHOTOQUAD NEWS**

The 1994 and 1995 aerial photo mission maps (pages 43 and 44) show less activity than in past years. This seems to reflect two factors: 1) reduced agency budgets; and 2) the 1992 NAPP black-and-white photography of the entire state at 1:40,000 scale. The trend may continue, as agencies wait for the high-resolution satellites which NASA and others plan to put up in the next ten years.

Interest in orthophotoquads (OQ's), especially digital OQ's (DOQ's), remained high in 1994. All of Idaho's 24K quadrangles have traditional hardcopy OQ's on paper available. Although many first-generation OQ's from the early 1970's have been replaced, largely through cooperative efforts (see past IGIAC Annual Reports), many OQ's are older and of poorer image quality.

The newest emphasis is on DOQ's. These softcopy products have obvious value for resource mapping (and can be used to revise old 24K quadrangle maps). DOQ's are now available for a few quads in the McCall area, for areas flown by the Panhandle OQ Cooperative in 1993, and for additional areas of interest to the Bureau of Land Management (see pages 45 and 46). They will be available from this year's Southwestern OQ Cooperative.

Two key aspects of DOQ's are photo scale and image resolution. DOQ's from the U.S. Geological Survey (USGS) are made from 1:40,000 scale aerial photographs, and have 1 meter resolution; a complete 24K quad requires 160 megabytes of storage. DOQ's produced in Idaho by non-USGS agencies have been made from 1:80,000 aerial photographs, and have 2 meter resolution; a complete quad requires 37 megabytes of storage.

### **Idaho's Concerns about DOQ Scale and Resolution**

Federal policy on DOQ's is set by the steering committee of the National Aerial Photography Program (NAPP). NAPP insists that only 1 meter resolution DOQ's be made. IGIAC members have been happy with 2 meter resolution DOQ's, and have consistently recommended that Federal agencies accept and support such data.

Last year's IGIAC Annual Report included an article by Wayne Valentine supporting this recommendation (1993 Annual Report, pages 31-33). Since then, an additional concern about USGS 1 meter DOQ's has emerged. The USGS does not "dodge" (do a non-linear contrast reduction of) its photos during the OQ production process. This results in dark areas in steep, forested terrain. Dodging is done by private OQ producers working at 2 meter resolution.

In October 1994, Dave Gruenhagen, Idaho Department of Lands GIS Section Manager, wrote to Donald Light, the chairman of the NAPP steering committee. Dave's main points were that:

1. producing OQ's and DOQ's from 1:80,000 scale photographs is much less expensive than from 1:40,000 photos (and that governmental budgets are stretched);
2. interpreting resources from 1 meter resolution DOQ's, while desirable for urban or suburban locations, was unnecessary in Idaho's vast resource lands where 2 meter

resolution is adequate;

3. storing 1 meter resolution DOQ's requires great amounts of disk space (and actually, tape space); and

4. flying regional aerial photography projects on a cyclic basis is better than flying the entire state at once (as was done by NAPP in 1992), because the photos can be absorbed by the mapping community.

Dave criticized NAPP's insistence that 1:40,000 photography was the only national standard; he pointed out that other "standard" mapping products have changed through time, and urged that a broader standard including 1:80,000 photography be adopted.

Donald Light replied that: 1) storage costs are rapidly decreasing; 2) NAPP is a national program for 1:40,000 photography; and 3) if Idaho paid 50% of the cost, NAPP might fly 1:80,000 photography in 1997, when Idaho is planned for NAPP consideration. Light circulated his correspondence with Gruenhagen to the NAPP steering committee members and to various USGS officials. However, NAPP remains committed to 1:40,000 photography. (Light says NAPP will consider Idaho again in 1997; he wonders if Idaho is more interested in black-and-white or color infrared photographs.)

IGIAC continues to be concerned about this issue, and the IGIAC Recommendations to Federal Agencies (page 75) address the OQ issue.

### **Will Satellite Images Replace OQ's?**

The National Aeronautics and Space Administration (NASA) is planning its next three satellites. One, Landsat 7, will simply continue Landsat TM coverage, and provide continuity in that program. Another, code named "Lewis", will provide crude resolution, but will have many spectral channels. The third, code named "Clark", and scheduled for launch about the year 2000, is of great interest to natural resource managers. It is planned for three meter resolution: about ten foot pixels. Will availability of complete, current (and hopefully inexpensive) coverage in this format--which could be rectified to remove distortions--force aerial photo users to rethink the issue of resolution?

### **Southwestern OQ Cooperative Project News**

The Southwestern Idaho orthophotoquad cooperative project includes an area of 112 quadrangles (see map, page 45). The project is to produce digital OQ's at two meter resolution. Cooperators include the Bureau of Land Management, Department of Lands, Division of Environmental Quality, Boise Cascade Corporation, and the U.S. Forest Service.

Black and white photography was flown in June, 1994, at 1:80,000 scale. Materials have been assembled for the aerotriangulation and scanning. Orthophotos are scheduled for delivery in the fall of 1995. Deliverables will be both a digital and hardcopy orthophoto.

1994 Aerial Photo map

## 1995 Planned Aerial Photo map

## McCall OQ Coop Map

BLM OQ acquisition map

DOQ status map

## **IDAHO GEOGRAPHIC INFORMATION CENTER**

### **1994 REMOTE SENSING PROJECTS SUMMARY**

The Idaho Department of Water Resource's Idaho Image Analysis Center became the Idaho Geographic Information Center (IGIC) in 1992. IGIC primarily uses ERDAS and a suite of in-house developed programs for image analysis. IGIC has a library of complete Landsat MSS scenes of Idaho from 1987, and many other MSS and T scenes as well. Here are some major projects IGIC worked on in 1994:

#### **Vegetation Map of the Boise National Forest**

Landsat Thematic Mapper (T) data (acquisition date: 6/20/92) were analyzed using image processing and image interpretation procedures and stratified using slope, aspect, and elevation data to develop a vegetation cover and forest maturity map of the entire Boise National Forest. The scale of the map is 1:168,960.

#### **Land cover mapping: C.J. Strike area**

Land cover maps were developed for the Idaho Power Company using photo-interpretation of 1:8,400-scale color infrared (CIR) photographs. The study area was approximately one mile wide and covered 47 river miles along the Snake River, from Grandview to two miles upriver from Glenns Ferry. The study area also included sixteen river miles along the Bruneau River and all of Bruneau Dunes State Park.

#### **Land use and land cover map of the Payette Basin**

A general land use and land cover map of the Payette River Basin was developed using image processing of Landsat T data (acquisition dates: 6/20/92 and 8/1/93).

#### **Boise Valley project**

Work started on a joint Bureau of Reclamation (BOR)-IDWR project to determine the changes in irrigated land that have occurred in the Boise Valley from 1915 to 1994. The study area covers 44 townships. The project involves digitizing 1915 plat maps and developing a land use and land cover database from 1:12,000-scale CIR photographs. The photographs are scanned, rectified, and mosaicked into images that cover a township. The digital images will then be photo-interpreted to develop a land use and land cover database.

#### **Points of Return**

The third phase of a three-year project to map points of irrigation return-flow (POR's) into the Snake River began in 1994. The points of return were identified on 1:6,000-scale color infrared

photography, which was taken in August, 1994. The location of each point was plotted on 1:24,000-scale quad maps, and attributed as to type of return (e.g. agricultural drain, fish farm outflow, natural stream, etc.), the width in meters, whether or not water was flowing, and the side of the river on which the POR is located. The PORs were then digitized to create a point coverage.

## GLOBAL POSITIONING SYSTEMS SUBCOMMITTEE

by John Courtright  
Idaho Division of Environmental Quality

Two subcommittee meetings were held during 1994 which reviewed and then finalized the "Guidelines for Resource Grade GPS Coordinate Accuracy" standards document. These standards were formally presented and then adopted by IGIAC in late 1994. Over time these standards will evolve as the technology advances and data gathering requirements change. They appear in Appendix B.

Additional GPS base stations are being established in Idaho and there is an emerging effort among federal and state agencies to optimally place the base stations to best serve all users. This placement is contingent upon the interoperability of the base station data. RINEX (Receiver Independent Exchange Format) is the current product expected to make it possible to exchange data; however, this format has not been formalized and numerous versions exist with marginal compatibility. The National Geodetic Survey has developed RINEX 2 and has presented this standard to industry for review which if adopted will remove the barriers of data exchange. Members of the GPS subcommittee will be conducting a RINEX 2 evaluation and expect in the near future to devise procedures for exchanging data in this format.

Other notable GPS activities include an aerial GPS project conducted by Idaho Power along the Snake River. Idaho Power presented information discussing their procedures and results with this effort. Real time differential corrections have been accomplished in Hailey, Idaho by a local geodetic GPS user. Federally funded real time differential correction capabilities could be coming to Idaho from the establishment of Continuously Operating Reference Stations (CORS) if Idaho is selected to receive a sit. This is not planned at present, but may always change. The Environmental Protection Agency (EPA) has developed their Method Accuracy Description (MAD) codes for the collection and storage of GPS data. EPA has suggested requiring the use of these codes in GPS projects funded by EPA.

An example of the new GPS technology is the Precise Precision Service (PPS) PLGR receivers. These receivers have accuracies in the 10 metre range and do not require differential corrections. The receivers are inexpensive, yet the Department of Defense (DoD) has stipulated that the receivers can only be purchased by Federal agencies and are not to be loaned out for use to other agencies or contractors. DoD has additional requirements for the use of the receiver which further impacts its usefulness. Federal agencies including the Natural Resources Conservation Service have an agreement with DoD while other agencies have been debating whether or not to pursue an agreement with DoD.

The subcommittee in 1995 expects to pursue the use of RINEX 2 to make base station data available to a wide variety of GPS users. This will require cooperative efforts among state and federal agencies to make certain that the data is compatible and also available. The subcommittee will also pursue the establishment of an Internet address to make GPS-related data readily

available. The address may include GPS news and lists of names and contacts for base station data, and would exist under an IGIAC address.

Anyone with GPS questions should feel free to call me and I can always pass information on to others who are more knowledgeable in specific GPS topics. I can be reached at (208) 334-5871 at the Idaho Division of Environmental Quality located in Boise.

## GLOBAL POSITIONING SYSTEMS IDAHO USERS

MAKE	BASE STATION	AGENCY	CITY	CONTACT	TELEPHONE
Trimble	Ada	Ada County Highway	Boise	Dorrell Hansen	345-7667
Trimble	Sho	Agricultural Research Service	Boise	Greg Johnson	334-1363
Trimble	McC	Boise National Forest	Boise	Darrel Van Buren	364-4147
Trimble	ITD	Bureau of Reclamation	Boise	Dan Lute	378-5272
Trimble	Sho	Bureau of Land Management	Boise	Tim Geary	384-3134
Trimble	Sho	Id. Army National Guard	Boise	Dana Quinney	384-6055
Trimble	McC	Id. Conservation Data Center	Boise	Bob Moseley	334-3402
Trimble	ITD/Sho	Id. Dept. of Water Resources	Boise	Ken Neely	327-5455
Trimble	Sho/Mis McC/KE	Id. Div. Environmental Quality	Boise	John Courtright	334-5871
NovAtel	Nov	Id. Transportation Dept.	Boise	Chuck Gillin	334-8232
Trimble	Sho/McC Mis	Idaho Power	Boise	Mark Druss	383-2925
Trimble	Sho/McC	National Biological Survey	Boise	Deanna Dyer	384-3481
Magellan 5000		US Geological Survey	Boise	Paul Woods	387-1353
Garmin GPS 100		US Natural Resource Conservation Service	Boise	Ron Abramovich	334-1614
Trimble	KE	Id. Department of Lands	Coeur d'Alene	Larry Morrison	769-1525
Trimble	WWP/KE	Kootenai County	Coeur d'Alene	Bruce Anderson	769-4401
Trimble	Mis	Panhandle National Forest	Coeur d'Alene	Dwight Makinson	765-7427
Trimble	Mis/McC	The Nature Conservancy	Deary	Janice Hill	877-1179
Trimble	Mis/McC	Nez Perce National Forest	Grangeville	Daryl Mullinix	983-1950
Trimble	Equ	Equinox Inc.	Hailey	Roger Brink	726-8200
Motorola	KE	Kootenai Electric	Hayden	Dennis Hinton	765-1200

MAKE	BASE STATION	AGENCY	CITY	CONTACT	TELEPHONE
LGT 1000					
Corvallis Microtech	NwM	Boise Cascade Corp.	Horseshoe Bend	Steve Warren	793-2241
Trimble	INEL	Lockheed Martin Idaho Tech.	Idaho Falls	Ron Rope	526-9491
Custom		NOAA	Idaho Falls	Gene Start	526-2743
Trimble	McC	Nez Perce Tribe	Lapwai	Jack Bell	843-2253
Trimble	McC	Id. Dept. of Fish & Game	Lewiston	Frances Cassirer	799-5010
Trimble	NwM	Potlatch Corporation	Lewiston	Dennis Murphy	799-1156
Trimble	McC	Payette National Forest	McCall	Mike Coffey	634-0649
Trimble	NwM	Northwest Management	Moscow	Vaiden Bloch	883-4488
Trimble	Mis,UoI	University of Idaho	Moscow	Larry Lass	885-7629
Trimble	WWP/KE	Coeur d'Alene Tribe	Plummer	Perry Kitt	686-1800
Trimble	INEL	Bannock County Weed Control	Pocatello	Tracey Holbrook	234-4139
Trimble	ISU	Idaho State University	Pocatello	Tracey Bowlin	236-2154
Trimble	Mis/McC	Clearwater National Forest	Orofino	Steve Staab	476-4541

### **Base Stations**

Blank No base station data is used.

Ada Ada County Highway District, Trimble Base Station, Boise, Idaho

INEL Lockheed Martin Idaho Technologies, Trimble Base Station, Idaho Falls, Idaho

Equ Equinox Inc. (Roving base station)

ISU Id. State University, Trimble Base Station, Pocatello, Idaho

ITD Id. Transportation Department, Trimble Base Station, Boise, Idaho

KE Kootenai Electric, Trimble Base Station, Hayden, Idaho

Mis US Forest Service, Trimble Base Station, Missoula, Montana

McC US Forest Service, Trimble Base Station, McCall, Idaho

Nov Id. Transportation Department, NovAtel Base Stations, Coeur d'Alene, Shoshone, New Meadows, and Rigby, Idaho.

NwM Northwest Management, Trimble Base Station, Moscow, Idaho

Sho Bureau of Land Management, Trimble Base Station, Shoshone, Idaho

UoI University of Idaho (School use), Trimble Base Station, Moscow, Idaho

WWP Washington Water & Power, Trimble Base Station, Spokane, Washington

## METADATA SUBCOMMITTEE

By Robert Harmon, Idaho Department of Water Resources

### Transition year

1994 proved to be a transition year for the Metadata Subcommittee as we waited to see how the FGDC (Federal Geographic Data Committee) would progress with its metadata standard, whether the IGIAC Metadata Standard would meet with approval from IGIAC's executive committee and users, and what form an IGIAC metadata clearinghouse would take.

### IGIAC approval

The IGIAC Metadata Standard, ver. 3.0, was presented as a draft standard to the IGIAC at its Fall 1993 meeting and formally approved by the IGIAC executive committee during its February 1994 meeting. In April, Hal Anderson formally submitted it to the Idaho Information Management Council for its approval. The Standard appears in Appendix A.

While the Standard fared well with the executive committee, the reaction from the user community was 'quiet' at best. Only a few sites reported using the Standard at all--one did submit paper copies of its completed metadata forms. The metadata subcommittee surmised that most sites were generating some metadata and awaiting the release of a digital template(s) to make data entry easier. Bob Smith, Idaho Department of Lands, wrote an ARC/INFO AML that uses a coverage's LOG file to store some metadata information. Frank Roberts, Coeur d'Alene Tribe, adopted Bob Smith's AML with some variations. Bob Harmon and David Palmer at the Idaho Department of Water Resources are continuing work on their AML.

### IGIAC vs. FGDC?

Considering the large Federal presence in Idaho--in terms of land ownership, number of agencies and their personnel, and cooperation on contracts/projects with state and private entities--the Metadata Subcommittee decided that the IGIAC Metadata Standard should comply wherever possible with the FGDC metadata standard. The subcommittee also agreed that the IGIAC standard would be maintained as a 'user-friendly' version of the FGDC document. This gained added significance with the release of the second draft (1/25/94) of the FGDC metadata standard--a much larger and more complex version than the original 10/92 version.

As the subcommittee began to address the differences between the metadata standards, the FGDC released the 'final' (6/8/94) Content Standards for Digital Geospatial Metadata. So, the subcommittee began anew its efforts to identify and reconcile the differences between the Idaho and Federal metadata standards.

### **IGIAC Clearinghouse & NSDICAP Grant**

In its 1993 report to the IGIAC, the Metadata Subcommittee identified several options for establishing an IGIAC metadata clearinghouse. Luke White and Julie Brizzee, EG&G (now Lockheed--Idaho Technologies Co.), worked on developing a WAIS (wide area information service) server on the Internet where metadata text files could be queried and accessed. They received a \$34,000 grant from EG&G to set up the server, input the I.N.E.L.'s metadata into their Oracle database, and obtain a summer-hire teacher to develop a training package for metadata-WAIS users.

At the Fall '94 IGIAC Annual Meeting the Subcommittee received a lot of favorable reaction to the proposal for the IGIAC to create and maintain a metadata clearinghouse on the Internet--most likely as a WAIS server. The Subcommittee met soon thereafter to prepare an application for a NSDICAP (National Spatial Data Infrastructure Cooperative Agreements Program) grant.

NSDICAP is a FGDC program which awards up to \$25,000 in matching funds to public and/or private entities, and partnerships between the two, in order to facilitate access to spatial data through the NSDI (National Spatial Data Infrastructure). The state GIS group in Montana received a NSDICAP for fiscal year 1994 (7/94 - 6/95). The key portion of Idaho's NSDICAP grant application--the four page narrative of the plan--follow on pages 54 through 57. The three key people connected with this proposal are Bob Harmon, Hal Anderson, and Luke White.

(Note: As we went to press, we received word that Idaho did indeed receive approval of its NSDI grant application. Congratulations to Hal, Bob, and Luke!)

### **Summary**

The subcommittee ended up meeting five times through the course of the year with an average of six to eight people attending each meeting. Work continues on revising the IGIAC Metadata Standard so that it not only complies with the FGDC standard, but remains a usable resource that supports and promotes metadata creation and maintenance. Ultimately, metadata is intended to be a shared resource on a IGIAC WAIS server so that it will be available to all spatial data users. The NSDICAP grant will assist the Metadata Subcommittee in its efforts to create a IGIAC WAIS server.

## NSDI PROJECT PROPOSAL

Idaho's extensive experience with the development and coordination of Geographic Information System (GIS) standards provides a strong foundation on which to build part of the National Spatial Data Infrastructure. Past efforts of the Idaho Geographic Information Advisory Committee (IGIAC) in coordination and standardization have focused on compatibility with national (Federal) mapping and spatial data programs. Idaho has been successful in implementing some of the goals of the FGDC but there is still much work to be done. This project will be administered by the Idaho Geographic Information Center (IGIC) within the Idaho Department of Water Resources (IDWR) and will provide for the development of mechanisms and infrastructure to document and distribute geospatial data in Idaho.

Our goals for the effort include:

1. Implement nodes at key data developer sites and/or archiving facilities accessible through Internet, modem, or personal communication.
2. Refine the existing Idaho Metadata Standard which was based on the "draft" FGDC metadata standard. The purpose of this is to comply with the final version of the FGDC standard.
3. Implement the revised Idaho Metadata Standard and populate the key nodes developed in goal one with metadata.
4. Develop an implementation strategy for an Idaho Geospatial Data Clearinghouse. This strategy will be designed to be consistent and compatible with the National Geospatial Data Clearinghouse and the recommendation of the Idaho Metadata Subcommittee.
5. Educate and train users and developers of geospatial data in using the node network established in goal one.

Given the tremendous amount of federal land ownership in Idaho, over 60 percent of the state, federal agency involvement and cooperation are essential. This coordination need is particularly important in the area of geospatial data development and sharing. Significant efforts and resources are currently focused on integrated natural resource (ecosystem) management in the Pacific Northwest. In fact, on-going coordinated environmental assessments collectively known as the Eastside Ecosystem Management Program, which includes Idaho, is a national priority. This and other efforts are contributing to the national spatial data infrastructure in that they will generate geospatial data that could be very useful to numerous state, local and federal agencies.

Providing the tools and procedures necessary to develop the infrastructure for data documentation and distribution requires resources. Currently there is no organization charged or funded to do that work for Idaho. To date, all the geospatial data coordination activity which are provided for by gubernatorial executive order are unfunded and strictly voluntary. There is keen interest and commitment by Idaho organizations (state and federal) to develop a spatial data distribution infrastructure but there is a real need for funding to make it happen. If this proposal is funded it will provide the catalyst to get an infrastructure established in Idaho. If it is not funded it will most probably be several years before any significant progress can or will be made.

There are other states, especially small population large land area western states, which are also not funded to document and distribute geospatial data. The process and procedures developed in Idaho

will be directly applicable to use as a model for those other states.

### **Technical Approach**

This proposal has been broken into five major tasks. Task one involves the reconciliation of state and federal GIS Metadata Standards. Task two is directed to compiling an existing documentation system for metadata documentation and storage. Task three specifically addresses establishment of an internet-based metadata service, including installation of a network server. Task four details the training for access of this server. Finally, task five describes the work involved in documenting existing GIS data holdings and populating a metadata database.

Task #1: Update Current IGIAC Metadata Standard: The IGIAC Metadata Standard (v. 3.0) was compiled and adopted by the IGIAC Metadata Subcommittee in 1993 to provide a consistent mechanism for documenting spatial data by organizations in Idaho and facilitate data exchange with other sites. Since the IGIAC Standard closely mimics the first FGDC Draft Metadata Standard (10/92), data exchange with organizations around the country that conform to it should be enhanced.

Now that the FGDC has completed the Content Standards for Digital Geospatial Metadata the IGIAC Metadata Subcommittee needs to revise its metadata standard. The subcommittee will have several working meetings to review and compare the standards, and outline differences between the two. Working from the outline, the subcommittee will draft a new IGIAC Standard. The Metadata Subcommittee will have a final meeting for final review and acceptance. The chairman of the subcommittee will compile the final draft and submit it to the IGIAC chair for final approval by the IGIAC Board.

Task #1 Procedures will be:

1. Outline the differences between the IGIAC Metadata Standard and the FGDC Metadata Standard. (40 hours)
2. Review the differences identified in #1 and compile a draft of the revised IGIAC Standard. (46 hours)
3. Compile appropriate changes into a final version of the IGIAC Metadata Standard. (34 hours)

Task #2: Finish Existing Digital Interface for Implementing Metadata Standard: It has been the goal of the IGIAC Metadata Subcommittee to implement the IGIAC Metadata Standard primarily through a digital interface. The Subcommittee feels that the IGIAC Standard will gain wider acceptance by the user community if it is fairly easy to implement. A digital interface would fulfill this goal. The IGIC began the effort in 1993 by creating an ARC/INFO AML (Arc Macro Language) module that a majority of spatial data users in Idaho can use. A nominal amount of work remains to finish the interface, develop the on-line help system, and test the module. Since the interface supports the current IGIAC Metadata Standard, it will also have to be updated to reflect changes made in the Standard to bring it in conformance with the FGDC Content Standards for Digital Geospatial Metadata (Task #1). The IGIC will perform this update as well.

Task #2 procedures will be:

1. Complete development on the IGIAC Metadata AML-module. This includes implementing an on-line help system and testing the module. (100 hours)
2. Update the IGIAC Metadata AML-module to reflect revisions made in the IGIAC Metadata Standard (Task #1). (35 hours)

Task #3: Create and Install IGIC Server Node at IDWR: This activity includes the installation of a WAIS Server system on one computer at the Idaho Department of Water Resources (IDWR). Existing USGS supported software will be used to establish this node. Current software will be downloaded from the appropriate software server (currently Dortmund University in Germany freeWAIS-0.2-sf), the installation procedures will be customized for the IGIC server node, and the system will be built for execution on the chosen platform. Any necessary modifications to the make files will be performed at this time to accommodate the differing libraries from the Sun standard make file (IDWR will use a Digital Equipment Corporation Computer).

The system administrator and a selected backup will be trained in the operation and maintenance for the WAIS server. Datasets from the IDWR metadata collection will be uploaded and indexed in order to demonstrate the functionality and operation of the WAIS software. The system will be automated as much as possible to assist in keeping the WAIS index current.

Additionally, an internet-based tool such Mosaic will be built on a selected workstation at IDWR, and existing Forms capabilities of Mosaic will be demonstrated (perhaps using MetaMorph, again from USGS). Detailed hands-on training will be conducted from a system administration point of view using both WAIS tools and the Mosaic (or other) client piece. Various types of client hardware will be demonstrated on-site.

Task #3 procedures will be roughly divided as follows:

1. System Administration Training Preparation. (42 hours)
2. Install WAIS and Clients on various platforms (42 hours)
3. Customize software and assure that existing IDWR business practices are accommodated with this application. (26 hours)
4. System Administrator training for clients and system software. (30 hours)

Task #4: Contributor Training: This system will be configured to allow contributors from state and federal agencies to provide metadata files to a common repository. This may not be the ultimate configuration, but both hardware and Internet access limitations dictate this approach during the first year of operation.

The success of the finished system largely depends upon volunteer GIS developers providing their metadata information for statewide and nationwide sharing. In order for this to succeed, the contributors must be adequately trained both in the operation of the system and in the ultimate usefulness of the system. Currently, in Idaho, we have the advantage that the GIS user community is small, and all developers are at least familiar with other members in the community, so training and system dissemination should be attainable.

This task covers the activities involved in training a selected set of contributors in the use and maintenance of client pieces for access to the IGIC Metadata server. We have identified contributors from the Idaho Department of Water Resources, the Idaho State Library, the Idaho Department Fish

and Game, and all State Universities. Contributions will also be elicited from various federal agencies acting within the state (Idaho National Engineering Laboratory, U.S. Bureau of Land Management, and Forest Service). Training will be offered to representatives from the Tribes.

Task #4 procedures will be broken into three parts:

1. Overview Training. How the system will operate, and the advantages to the community of this system.
2. Metadata Standard Training. A detailed presentation of the Metadata Standard, including specific examples for data that are stored in each field of a metadata record.
3. Hardware and Software Training. Including installation and setup of various hardware/software configurations ranging from character-based (SWais), modem supported access to Mosaic clients running with full Internet access.

We expect to see 100 hours spent in preparation for this training, and 40 hours spent in actual presentation (two instructors for a one-day seminar).

Task #5: Existing Dataset Conversion: We anticipate that most federal agencies active in Idaho will have much of their data holdings documented according to the Federal Standard by last quarter of FY-1995. Some effort will be spent in acquiring suitable electronic copies of the metadata sets that these federal agencies deem appropriate for sharing with the GIS community in Idaho and elsewhere. This team will solicit metadata sets from the various forests within Idaho, the U.S. Bureau of Land Management offices, the Natural Resources Conservation Service, the U.S. Geological Survey and the Department of Energy. Acquisition and upload should be a small part of the budget for this activity.

The bulk of the funding for this activity will be spent in documenting GIS datasets' documentation according to the revised Metadata Standard, and subsequently uploading these datasets to the IDWR metadata server. The agencies that will provide the bulk of the metadata information are the Idaho Department of Water Resources, the Idaho Department of Lands and the Idaho Geological Survey. All of these agencies have large GIS data holdings, and the need to document these data holdings is pressing.

Each selected agency will provide a prioritized list of data holdings to be documented. Funds will be allocated to the agencies based on a priority as determined by the Metadata Subcommittee. Each agency will then provide the metadata information about their most critical datasets, and this information will be loaded to the IDWR server node. Alternatively, if the hypertext tools being built by USGS are complete by this time, each agency may enter their own information directly into the server database. This work will continue as funding lasts for the activity. We estimate 320 hours spent in actual data entry efforts by the agencies. Funds for the data entry portion of this task are included in the "Services Category" of the proposal budget.

Task #6: Reporting and Technical Coordination: Semi-annual progress reports and a final technical report will be completed and submitted to the FGDC Project Officer. Written reports will be prepared using the format described by FGDC.

A formal oral presentation will be made at the IGIAC annual meeting. Additional presentations may also be made at workshops, conferences and other public meetings. The Idaho Project Director will contact the FGDC Project Officer to determine if additional presentations would be of interest. We estimate 120 hours involved in this task effort.

## MAP PROJECTIONS AND DATUMS

Map projections are models which allow us to depict the round (well, almost round) earth on a flat piece of paper (or computer screen) with predictable (and hopefully minimal) distortions. Map datums are sets of known points with known locations in a well-defined coordinate system. The year 1994 saw two major developments in Idaho.

Revised ISPCS: One major change was the adoption of the Idaho Coordinate System (ICS), which was proposed in 1994 and adopted by the 1995 Legislature in House Bill No. 17. Until this action, the only officially endorsed State Plane Coordinate System of 1927 (now officially abbreviated as "SPCS 27"). It was based on the North American Datum of 1927 (NAD27), which has proven increasingly inaccurate as time went by.

Now, with this legislation, State Plane Coordinate System of 1983 (SPCS 83) is adopted. It is based on NAD83, a more accurate datum based primarily on a readjustment of the 1927 work, but with some more modern surveys incorporated. As did SPCS 27, SPCS 83 has three zones, East, Central, and West. Most GIS software already includes this projection.

The legislation requires that after December 31, 1995, survey control station positions must be established with SPCS 83. It also liberalizes an old limitation on use of coordinates in describing land boundaries. Under SPCS 27, for a corner to have valid coordinates, it had to be within one mile of a survey control point with published coordinates. Under SPCS 83, the corner must be within five kilometers.

The revised law appears in Idaho Code Title 55, Sections 1701 through 1709.

IDTM: In the second major change, IGIAC endorsed the Idaho Transverse Mercator Projection (IDTM). Idaho digital mappers have long struggled with the lack of a single, consistent, suitable map projection for the entire state. Lack of such a projection has added uncertainty and extra work when exchanging digital map data among agencies.

The most obvious projection, the Universal Transverse Mercator (UTM), was flawed because Idaho is in both Zones 13 and 14; neither satisfactorily depicts the entire state. A second candidate was the same Lambert projection used by the USGS on their large 1:500,000 and smaller 1:1,000,000 scale printed maps of Idaho. This projection was optimized for the entire United States, and has excessive distortions when used for digital mapping of Idaho alone.

Because of Idaho's 480 mile height versus only 305 mile width, a transverse Mercator projection seemed optimal. Wayne Valentine developed one which is called the IDTM. It creates a one zone transverse Mercator projection which works for the entire state. Almost all GIS software is capable of using this projection definition. Area distortion is greatest along the eastern and western borders of the state, but it is never excessive.

In October 1994, IGIAC adopted a formal policy statement concerning IDTM. The statement

appears as Appendix C, on page 96.

## **GEOID/ELLIPSOID SEPARATION**

By John Courtright, Division of Environmental Quality

The Geoid/Ellipsoid Separation Map on page 60 displays graphically the separation between the geoid mean sea level (MSL) elevation and the ellipsoid height within the state of Idaho. In the past, map elevation was referenced to MSL; however, with the advent of global positioning systems (GPS), there has evolved a requirement to also express elevation in height above ellipsoid (HAE).

Programs such as the National Geodetic Survey GEOID93 are used to calculate the separation value, which can then be applied to determine either geoid or ellipsoid elevation. This map graphically displays selected computed results to assist in explaining the concept and computed values.

The map was generated using GEOID93 to calculate the separation values for every 30-minute intersection of latitude and longitude covering the state, a total of 175 points. The results were then projected to UTM and converted to contours using the U.S. Natural Resources Conservation Service GRASS program. Twenty test points were selected and checked against actual computed values. For 19 points, the error was less than 0.5 meter; the final point was within 0.6 meter. There are also two small anomalies which have been removed to better display the trend in the separation; they are both in eastern Idaho.

This map serves only as a graphic display and should not be construed as to provide accurate information as the GEOID93 program. This map was prepared in the fall of 1993 by the Idaho Division of Environmental Quality, the U.S. Natural Resources Conservation Service, and the Idaho Department of Lands. It is an improved version of the map produced in 1992 using GEOID90.

geoid/ellipsoid map

## WATERSHED SUBCOMMITTEE NEWS

By Hal Anderson, Idaho Department of Water Resources

Ecosystem management, endangered species, cumulative effects, comprehensive basin planning, water right adjudication and many other natural resource management issues require tremendous effort in data collection. The issues themselves have different requirements, but some of the information being collected to help resolve them is useful for a variety of other purposes.

Watersheds are used to subdivide the landscape into discrete units. These units are developed by various agencies and programs using a variety of land form, hydrologic and administrative boundary criteria. A cursory evaluation of existing and proposed watershed delineation strategies for Idaho came up with more than a half dozen. They were all quite variable in form, scale and completeness.

The problems resulting from the various watershed delineations come when trying to compare or use information obtained from one or more different strategies. This problem prompted the Idaho Geographic Information Advisory Committee (IGIAC) to organize a meeting which included state and federal land and water resource managers to discuss the possibility of developing a standardized watershed boundary and indexing system for Idaho. The managers' response was positive, and a cooperative project was developed with the goal of completing maps and GIS coverages within one year. The proposed completion date was March 1995. The effort required change and commitment by every organization involved but has been a very positive example of cooperation between governments and agencies.

The actual watershed delineation work was done by six organizations (see map on page 63). Criteria which were used to delineate and index the watersheds were cooperatively developed (see next page). After agreeing to delineation criteria, the organizations came together for an initial pilot work session and training effort. After the techniques were developed and the process established, each agency went back and completed their assigned watershed delineations. Watershed were assigned to agencies based on major land management responsibility or interest. The Interior Columbia Basin Ecosystem Management Project provided significant technical and GIS support to this project.

A draft version of the map appears on the front cover of this report. The fourth field watershed boundaries (thick black lines) roughly correspond to the U.S. Geological Survey's eight-digit Hydrologic Unit Codes. The fifth field boundaries (thick gray lines) were delineated by Watershed Subcommittee members. Sixth field boundaries (not shown) were further delineated by the East Side Ecosystem study team.

The Idaho Department of Water Resources volunteered to keep, maintain and distribute these watershed delineation products. It is planned to have products available for distribution in draft form by early summer 1995. After a one year distribution use and correction of the draft products, a final version (Version 1.0) will be produced.

## **IDAHO GEOGRAPHIC INFORMATION ADVISORY COMMITTEE COOPERATIVE WATERSHED BOUNDARY DELINEATION CRITERIA**

1. Boundaries on ridges, not streams. Hydro based; therefore no isolated territory. All areas to be included. An exception here may be a canal. Canals are man made and often follow contours intercepting streams and can be used as a watershed boundary.
2. Approximate average size 50,000 acres. Size range 10,000 to 100,000 acres. This is general size criteria, exceptions are acceptable if defensible, i.e., lava fields in southern Idaho with limited drainage are larger than 100,000 acres.
3. Adopt existing ridge-line boundaries where they meet these criteria. Review existing watershed maps and adopt as many established boundaries as possible if they make hydrologic sense and meet these criteria.
4. Delineate pure watersheds first. Extend boundaries directly across rivers to pick up the ridgeline on the other side. This rule may be modified if necessary in agricultural lands around reservoirs, but deviations should be noted.
5. Index using USGS eight-digit HUC (Hydrologic Unit Code), with a two digit extension. Number values to increase clockwise facing upstream, beginning at the "pour point." Further subdivisions are to follow the same logic. Each watershed should be named, i.e., 1701030506. Last two digits represent the 6th watershed upstream from the pour point in the Upper Spokane Hydrologic Unit. Example names for this watershed could be "Hayden Lake" or "Hayden Creek".
6. Boundaries will converge to confluences ("pour points") or other major hydrologic points, e.g. dam or major diversion.
7. Responsibility for mapping and indexing assigned by Hydrologic Unit to majority land owner, with IDWR and BLM taking agricultural lands. The need to coordinate with neighbors both within and adjacent was agreed to.
8. Objective is to have statewide maps and GIS coverages completed by spring of 1995.

Note: This process defines the subdivision of the USGS Eight-Digit Hydrologic Units into watersheds of variable size but averaging approximately 50,000 acres. This subdivision is sometimes referenced to as 5th field watershed. Further subdivision to subwatershed (6th field, 7th field, etc.) can be accomplished using the same process but using different size (acreage) ranges.

watershed responsibilities map

## USGS status report

## **GEOGRAPHIC COORDINATE DATA BASE: THE BLM'S STRATEGY FOR DATA COLLECTION AND MAINTENANCE**

by William S. DeGroot, GCDB Manager, Idaho State Office, BLM

The Issue: The Geographic Coordinate Data Base (GCDB) is critical to the Bureau of Land Management's responsibilities to manage the public lands as well as other government agencies and private industry. Funding from Automated Land and Records System (ALMRS) sources will end at the close of FY 96, and a strategy for continued data collection and future operation and maintenance has yet to be adopted. Even the initial data collection effort (Categories 1-4) will fall short of completion by the end of FY 96 in some states, border states and the Eastern States Office, as well as the unfunded Categories 5-6 townships. This will leave significant gaps in the Bureau's spatial data base for the Public Land Survey System (PLSS).

In addition, Executive Order 12906, Coordinating Geographic Data Acquisition and Access: The National Spatial Data Infrastructure (NSDI), states "Agencies shall continue to fund their respective programs that collect and produce geospatial data..." and that this data will be incorporated as part of the Clearinghouse for wider accessibility. Collection of coordinates for most of the Category 1-4 townships, along with their attendant attributes, for most of the 10 western states and portions of Alaska is scheduled for completion by the end of FY 96.

BLM must modify its GCDB data collection strategy and expend the resources necessary to establish partnerships with other federal agencies, state and local governments, where possible. This could include exchanging parcel boundary record information with local governments which may contain more current information.

The Background: The Bureau of Land Management has a progressive approach to the administration and management of data. BLM has used information engineering methods, standardized key components of its land and resource data, established procedures to manage data as a valuable asset, and provided leadership and support to national efforts such as the Federal Geographic Data Committee (FGDC) and implementation of the NSDI.

A key part of the BLM's internal and governmentwide/national responsibilities is satisfying the requirement for Cadastral data. The GCDB standards and data models developed by BLM provide an excellent base for building into the interagency and intergovernmental arena. Likewise, GCDB is a critical piece of the NSDI as land survey and land records are foundation data important not only by themselves, but as a part of a national framework to which other spatial data can be registered and related for analysis and decision making. Every land use decision requires information about who owns the land and where it is located. The ultimate portrayal of land ownership (parcel boundary) information provided through GCDB will be the foundation for the ALMRS and GIS applications throughout the BLM; Department of Interior; other federal, state, and local agencies; and private entities or organizations. Data exchange provided through GCDB enables federal, state, and local governments as well as private industry to work from a common baseline of coordinate information and reduce duplication of effort. Where GCDB is available, the Forest Service requires its use in the Automated Lands Program (ALPS); and the U. S. Geological Survey requires its use in the development of their national map series (DLG). Benefits to nonfederal agencies are also significant as demonstrated by Oregon State Department of Revenue, which has utilized the GCDB to create County Assessor maps--saving an estimated 50 percent of mapping contracts.

The continued collection and maintenance of GCDB must be supported to establish a common PLSS

framework to support decision making across government agencies. Providing this common framework is dependent on establishing partnerships or cooperative efforts and cost sharing. In order to enhance the establishment of partnerships with State and local governments, BLM will need to modify its approach to incorporate parcel boundary records (survey information) from local governments and private industry; these often contain more current information. If BLM does not utilize these local records, the data that BLM collects may be unacceptable or conflict with local records (this information will be unusable at the local level). Once the large blocks of Federal surface lands are collected (areas of little or no local government activity), priorities will shift to areas where the surface is privately owned but the subsurface is federally administered. These areas are of increasing interest to local governments, and every effort should be made to assure that BLM and local data are the same through the use of the common source documents.

Without continued collection and maintenance, GCDB's value as a common reference framework will decrease over time. Benefiting applications such as ALMRS and Ecosystem Management will be faced with using data bases that are fragmented, incomplete, and out of date. The graphical portrayal and analysis of ownership and rights will be limited to the specific areas where GCDB has been collected. Applications will not have access to a complete spatial data base; therefore, general queries will not produce accurate statistical reports, and our internal and external customers will not have access to information through one system. This may create an unreasonable burden on our customers to determine current land status.

Mandatory Process for Conformance With Executive Order: The following processes are in priority order as defined by the National Performance Review and the Executive Order dated April 11, 1994, and are required to be followed:

1. Utilize existing qualified data. This data is to be located by searching the Clearinghouse, other Federal Agencies, State, and local government offices. It may be necessary to provide value added services to existing data to meet BLM needs.
2. Establish partnerships for the collection of necessary data with Federal, State, or local governments. Through partnerships the data may be collected by BLM, the participating agencies or local governments, or through joint efforts. Since Federal funds will be involved, the data must be collected to required standards.
3. Collect data in-house or through contracts. This methodology will be utilized only after all other efforts to obtain data have failed.

The Changing Role of Cadastral Survey: The traditional role of Cadastral Survey is changing to include increased responsibilities for the construction, update, and maintenance of a PLSS digital data base that is fundamental to supporting land and resource decision making in the BLM as well as other government agencies and private industry. The role of Cadastral Survey as the program lead for GCDB collection, operations and maintenance will include the following:

1. Data Steward: This responsibility includes full operations and maintenance distribution, exchange, and importation of data to assure the data is current, meets customer needs, and conforms to all of the requirements for national standards.
2. Digital Data Collection: Continue to provide and coordinate data collection to support needs of the Bureau as well as other government agencies and private industry. This will require that the Cadastral Survey program work toward establishing cooperative agreements and partnerships.
3. FGDC: The BLM, as the FGDC national lead for Cadastral spatial data for the Federal government, is responsible for the coordination of national cadastral data collection, dissemination, and sharing efforts; development of national data standards; and the development of partnerships with other Federal agencies and with State and local governments. Cadastral Survey will be responsible for the development and implementation for many of these responsibilities, and must

assure that BLM serves as an example of excellence to other Federal Agencies.

GCDB Operation and Maintenance Defined: Idaho is scheduled to complete the initial data collection plan by September 30, 1996. At this time we would then enter the Operations and Maintenance (O&M) phase. Thirteen primary functions for O&M of the Land and Survey Theme of GCDB have been identified by the Cadastral Survey Re-engineering lab:

1. Collect land and survey information and update the Land and Survey Theme and Control Theme: Collection includes the continued initial data collection of all township categories, including complexity 5 and 6 townships, uncollected complexity 1 through 4 townships, rights-of-way, easements, new parcels and new attributes. The new data will be integrated with existing data. Updating includes incorporating new control and/or survey data, performing adjustments, and updating attributes. Both internal and external data sources will be utilized in the update process.
2. Build and maintain a Control Theme: A positional control data base will be developed and maintained according to established data standards. Control gathered from both internal and external sources will be stored in the data base. This internal store will contain coordinate values and related information such as source, history, collection technique, positional accuracy, and supporting monument records.
3. Inventory and evaluate data from external sources: The Land and Survey Theme will be a shared data base which will continue to be improved through the contribution of data from external sources. One function of O&M will be to identify and inventory valid sources of data that can be incorporated into the Land and Survey Control Themes. Sources will include other federal, state and local agencies through partnerships and cooperative agreements, as well as private entities. External data will be evaluated for methodology and consistency with data standards before being incorporated into the data base.
4. Reformat and/or supplement data from external sources: This function involves the preparation of data received from external sources before it can be incorporated into the data base. For example, data may need to be reformatted or supplemented for naming conventions, conversion from plane to geodetic systems, unit and datum conversions, and merging different types of data.
5. Identify and resolve conflicts between incoming coordinate data and land descriptions: Because the Legal Land Description (LLD) is compiled from BLM legal source documents which are not geographically referenced, while the GCDB is computed geographically, differences will arise between these two sources of information as they are linked. Examples of conflicts include differences in LLD location versus GCDB location, and information that exists in LLD but not in GCDB, or vice versa. These conflicts will be identified and resolved through a consistent philosophy, based on management priorities.
6. Improve Land and Survey data to meet data standards, fill in missing data, and delete duplicated data: Initially, the data conversion process will flag problem areas where data is incomplete or fails to meet GCDB conversion standards. These problems will be resolved on a case by case basis as they are identified. In the long term, this function includes overall data base maintenance and coordination activities such as data improvement, data transfer, resolution of data quality issues, and quality assurance.
7. Determine schedule for updates and provide notification of updates: Updates will be performed according to a predetermined schedule or as-needed, depending on management priorities. Notification of updates will occur before, during and after the update process so users can plan accordingly.
8. Assist with the evaluation of impacts on other data themes from updates to the Land and Survey Theme: Because the Land and Survey Theme is vertically integrated with all other themes, shifts in coordinates will cause all other themes to shift. Timely notification of updates will be provided

to other theme managers so that the impacts on other data themes from updates to the Land and Survey Theme can be evaluated.

9. Verify, check, and correct updates made to the Land and Survey Theme: Other functions will have the capability to update and expand the Land and Survey Theme to initiate land actions. This may include creating new land parcels through subdivision by a parcel generator, by metes and bounds traverses, or by aggregating existing parcels into larger regions. These updates will need to be evaluated against source data to determine the adequacy of the land description, to determine if the subdivision method is acceptable, and to determine if the reliability of the new or existing data supports the land action. A cadastral Supplemental Plat may be required and the data must meet established standards.

10. Distribute digital data of the PLSS and Control data: This function responds to internal and external requests for a digital copy of the PLSS and control for specific areas. Distributed data will satisfy the Federal Geographic Data Committee's (FGDC) Spatial Data Transfer Standard and Cadastral Data Standards.

11. Produce cartographic and report products: Cartographic products include both standard and custom products. Standard products include control diagrams, Protraction Diagrams and Supplemental Plats as baseline Cadastral Survey products. Other graphical depictions as defined by users will require custom products. Report products are alphanumeric reports such as inventories, update and process histories, statistics, and reliability reports, etc.

12. Establish and execute partnerships for data sharing and exchange: Establishing partnerships for data sharing and exchange will help the BLM to acquire the most accurate information available, reduce the duplication of data, and reduce the expense of developing and maintaining a common data base. To facilitate data exchange, long term partnerships and cooperative agreements with other federal, state and county agencies will be arranged. This function includes training and user support.

13. Assume Data Stewardship responsibilities to assure compliance with data standards and quality assurance procedures: This function provides data stewardship and coordination with BLM State Data and Records Administrators. The Data Steward approves required documentation for automated data to attain "official agency record" status, supports the integrity of the data, assures the data fulfills administrative and statutory requirements, and authorizes use of the data for BLM decision making.

The Bureau's management team is in the process of evaluating several alternative approaches and funding levels to continue data collection and O&M in an austere budget atmosphere and competing Federal program. The recommended alternative supports national directives and Bureau data requirements within cost effective parameters. This alternative calls for continued funding at a reduced level to a base level in the year 2001. This would allow priority data to be collected and operations and maintenance to be implemented over a period of 5 years. It will also allow for consistent reductions while continuing to meet the Bureau's data goals and objectives. This strategy would also retain existing professional expertise and focus on establishing partnerships for collection as well as operations and maintenance. The retention of these professional skills will keep the collection and maintenance costs per township to a minimum.

Conclusion: We have developed a sound strategy for ALMRS/GCDB and a vision for the future involving partnerships with other Federal agencies, state and local governments. Will this strategy survive these times of severe Federal Agency budget and program cuts? We will keep you informed. If you have any question, please feel free to contact me or any of our GCDB staff at (208) 384-3144.

## GCDB Status Map

## ADDITIONAL GIS NEWS

Idaho Transportation Department: The Cartographics unit has now been elevated to the "Geographic Information Section" in the new Transportation Planning Division. Intergraph's MGE GIS software is now installed.

A major project involved incorporating Ada County Highway District's street centerline digital maps and ITD Milepost and Coded Segment (MACS) tabular data. Data conversion, training, and consulting services were provided by Power Engineers/GGI. Through this project, ITD now has a prototype GIS that can be used for developing additional transportation GIS applications statewide.

### Division of Environmental Quality

DEQ has purchased an IBM RS6000 RISC computer and is migrating from the PC environment and is migrating to workstation Arc/Info. Gail Ewart is working on the Cascade Reservoir Restoration Project, assembling a wide variety of GIS coverages, and building models to help determine spatial cause and effect in the Long Valley region. This work will solve the problem of algae blooms in Cascade Reservoir.

### State Tax Commission

The Technical Services Bureau has a new, fast HP UNIX-based workstation running ArcInfo release 7. It also has a new Senior GIS Analyst position. It is working with the Idaho Department of Lands to develop a consistent statewide 24K digital base map, using DLG, CFF, GCDB, and other data. This will be used for two purposes: as a base map for boundaries of taxing districts such as school district, fire districts, and cities; and as a map which would be made available to county assessors for their use.

### Boise National Forest

Remote sensing was used to create a base map for hazard risk modeling of the entire BNF, using a landscape approach. The study addressed two key questions: 1) where are forest ecosystems most at risk from severe large wildfires burning outside historic range of variability (HRV) due to ecosystem changes resulting from past management practices? and 2) what important forest resources are at risk to those severe wildfires?

The study created five GIS submodels to evaluate hazards:

1. forested vegetation outside HRV;
2. historical fire ignition points (aggregated by section);
3. wildlife persistence, risks to key species;
4. watershed hazards: erosion; and
5. fisheries persistence--key watersheds/fishery species.

This study--just completed--may form the basis of revision of entire forest management plan.

Contact Bill Rush, BNF.

### **UCRB**

The Upper Columbia Basin Ecosystem Management Project (UCRB) is a multi-agency effort to assess cumulative and interrelated impacts on ecosystems in Idaho and some adjoining Snake River watershed areas of Montana, Nevada, Wyoming, and Utah. It is an extension of the original study area of Washington and Oregon east of the Cascade Crest.

GIS is playing an important role in the study. A wide variety of digital data has been assembled by the central spatial information office in Walla Walla (the umbrella office for the Interior Columbia Basin Ecosystem Management Project, called ICBEMP). Like any other agency which acquires digital map data, it has had to create a policy on data distribution. The office's objectives are:

1. to provide a consistent strategy for managing the release of GIS/Spatial data from the ICBEMP GIS systems for federal office;
2. to provide timely response to requests while minimizing the impacts on their ability to complete ICBEMP analysis;
3. to provide consistent application for the Science Team and EIS Teams involved in the ICBEMP; and
4. to provide GIS/Spatial information that is adequately described.

ICBEMP has a Data Request Form, an Available Data List, and an Available Map/Plot List. The Available Data List has both short and long descriptions of the files. Data is available in Unix Arc/Info, MOSS, or raster export formats, as well as some ArcView files. Data is provided on 8mm tape unless otherwise specified. You may fax ICBEMP at 509-522-4025. Or, write:

Interior Columbia Basin Ecosystem Management Project  
Attn: GIS (Cindy Dean)  
112 E. Poplar Street  
Walla Walla, WA 99362

### **U.S. Bureau of Mines**

The Western Field Operations Center in Spokane reports three main Idaho projects: 1) the Pine Creek watershed in the Coeur d'Alene River basin is being studied as a Federal remediation area; 2) the Silver Crescent is having mine, mill, and waste areas studied for hazard; and 3) a mining claim density map of Idaho and seven other western states, with open or closed attributes for each mine.

### **Idaho Geological Survey**

Loudon Stanford reports that the Idaho Geological Survey (IGS) is designing methods for metadata collection using IGIAC's Metadata Standard as a base. Also, IGS is acquiring Intergraph PC/Windows GIS licenses.

### **University of Idaho Library**

The UI Library has installed ArcView2 on a machine available for public access, and has made products such as the Digital Chart of the World available for use.

The UI Library and the Idaho State Library, working with the Department of Lands and the Department of Water Resources, have been cooperating in a cartographic publishing project. To be published on four CD-ROM's, the project will include many coverages of Idaho produced by state agencies. The goal is to assemble a large data set in the Arc Export format that can be easily read on a wide variety of platforms and in a mechanical format (CD-ROM) with a large installed base. To the extent that CD-ROM discs can be said to be "archival", this publishing project will retain data for Idaho that will ultimately have historic value. The Idaho Geological Survey and other units of the UI are also expected to contribute data sets to this project.

# GEOGRAPHIC INFORMATION SYSTEMS IDAHO USERS

LICENSE SYSTEM	COMPANY/AGENCY	TYPE*	CONTACT	PHONE NUMBER
<b>INTERGRAPH</b>	Idaho Transportation Dept.	2,2,2	Roger North	334-8222
	Bonneville County	2,2,2,2	Janet Cheney	528-5568
	POWER Engineers/GGI	2	Andy Little	378-6303
	Westinghouse (INEL)	2	Bill Clark	526-8302
			John Williams	526-3443
<b>ARC/INFO</b>	POWER Engineers/GGI	2,1,3	Andy Little	378-6303
	Holladay Engineering	1	Tom Harris	642-3304
	Idaho Power Company	2,2,2,1	Frank Mynar	383-2977
	Power Engineers, Inc.	2	Mary Ann Mix	788-3456
	Morrison Knudsen	2,1	Lisa Wynn	386-5375
	Potlatch	3,2,2,2, 2,2,2	Dennis Murphy	799-1156
	Boise Cascade	2,3	Greg Carson	384-7639
	INEL Computer Services	2	Pam Boge	526-9379
	INEL Environmental Restoration	3(10)	Luke White	526-9154
	Sciencetech	3(6)	Kim Johnson	345-6788
	Peregrine Fund	1	Richard Watson	362-3716
	U.S. Bureau of Land Management (S.O. and all District offices)	3	Bill Yeager	384-3108
	U.S. Bureau of Reclamation	2,1,1	Mike Beaty	334-1392
	U.S. Bureau of Mines	1,1,1,1, 1,1,2,2	Paul Hyndman	(509) 353-2700
	U.S. Forest Service			
	Forest Science Lab	2,1	Dan Lee	364-4363
			Rodger Nelson	364-4394
	Pest Management	2,1	Joy Roberts	364-4134
	Intermountain Research Station	1	Lee Halbrook	882-3557
	Boise National Forest	2,2,1	Joe Frost, Bill Rush	364-4203
	Caribou National Forest	3	Bob Bolt	236-7541
	Payette National Forest	1	David Thom	634-0637
	Targhee National Forest	1	Bill Kirchhoff	624-3151
	U.S. National Biological Survey			
	RRTAC	3	Tom Zariello	384-3479
	Natural Resources Conservation Svc.	1	David Hoover	334-1525
	U.S. Geological Survey-WRD	2	Molly Maupin	334-1750
	University of Idaho			
	Facility Management	1	Craig Rindlisbacher	885-6671
	Forestry	2,1	Michael Scott	885-6960
	Agriculture	1	Larry Lass	885-6236
	Agriculture Research-Twin Falls	1		

\* 1 - PC License

2 - Workstation License or Node Lock

3 - Multiuse License

#### 4 - Terminal Access to Multiuser System

<b>LICENSE SYSTEM</b>	<b>COMPANY/AGENCY</b>	<b>TYPE*</b>	<b>CONTACT</b>	<b>PHONE NUMBER</b>
ARC/INFO	University of Idaho (cont'd)			
	Landscape Architecture	2	Toru Ottawa	885-6272
	Library	1	Dennis Baird	885-6534
		1,1,1,1,		
		1,1,1		
	Anthropology	1	Deborah Snyder	885-7492
	Chemical Engineering		Margarit Von Braun	885-7838
	Idaho Dept. of Fish & Game	2	Bart Butterfield	334-2772
	Division of Environmental Quality	2,1	John Courtright	334-5871
	Panhandle Health District	1,2	Randall Sounhein	667-3481
	Idaho Dept. of Water Resources	2,2,1,1,	Tony Morse	327-7997
		1,1,1,1,1		
	Idaho Dept. of Lands	2,2,1	Dave Gruenhagen	334-0277
	Idaho State Tax Commission	3,1	Rose Blazicevich	334-7718
	U.S. Bureau of Indian Affairs			
	Plummer	4	Mike Finity	274-2530
	Coeur d'Alene Tribe	4	Frank Roberts	274-3101
	Nez Perce Tribe	1,2	Jack Bell	843-2253
	Pocatello City	3	Dennis Hill	234-6230
	City of Lewiston	1,1	Dale Erickson	746-1316
	Boise City	2	Jim Hetherington	384-3900
	Ada County Highway District	3,1,1,1,1,1	Diane Holloran	345-7635
	Ada County GIS	2,2,2,2,2	Mike McClenahan	383-4460
	Ada County EMS	2	Kjeld Guglielmetti	383-4419
	Ada Planning Association	2	Kelle Weber	345-5274
	Canyon County Assessor	1	Harold Martin	454-7450
	Kootenai County Planning & Zoning	1,1	Steve Kirk	769-4401
<b>MOSS</b>	Bureau of Land Management	3,4	Bill Yeager	384-3108
<b>GRASS</b>	Bureau of Land Management	2	Mike Candelaria	384-3108
	National Resources Conservation Service	1,1	David Hoover	334-1525
	Idaho Military Division	2		389-5287

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3 - Multiuse License

4 - Terminal Access to Multiuser System

## **IGIAC RECOMMENDATIONS TO FEDERAL AGENCIES**

In accordance with its charter to make recommendations to Federal mapping agencies, IGIAC urges the US Geological Survey to create, maintain, and distribute a full, accurate, current database of map information about Idaho. To achieve this goal, IGIAC recommends USGS establish the following broad programs:

1. A program for systematically revising, updating, or replacing out-of-date, inaccurate, or non-standard 1:24,000 scale topographic quadrangle maps by the year 2000;
2. A program for completing and maintaining 1:24,000 scale and 1:100,000 DLG's based on the above quadrangle maps, in DLG-E or DLG-F format;
3. A program for collecting and distributing, through efficient on-line access, complete and current metadata on these and other analog and digital products;
4. An aggressive program for promoting cooperative projects, metadata collection, digital data quality control and standardization, and metadata and digital data distribution, with an office in Boise to facilitate this;
5. A program for assigning map maintenance responsibilities to cooperators, and for sharing these costs with them; and
6. A systematic program for collecting, acknowledging, analyzing, and responding to user reports of errors in both analog and digital map products, including more detailed version identification of digital data, efficient on-line access to error reports, and a mechanism for accepting user-corrected data.

IGIAC recommends the following changes in USGS and Federal orthophoto and aerial photograph programs:

1. Establish a cyclic program with regular (every five to ten years) flights of smaller blocks (100 to 600) of quadrangles;
2. Adopt flexible standards to allow 2-meter resolution from 1:80,000 photography, as well as 1-meter resolution from 1:40,000 photography, depending on user preference, resource values, and funding availability;
3. Through an office in Boise, aggressively pursue local cooperators for orthophotoquad revision; and
4. Work with other Federal agencies and local cooperators to fly 1:40,000 color infrared photography on a cyclic basis, in areas with intensive activity and change.

IGIAC also recommends the following specific changes in the USGS 1:100,000 scale mapping program:

1. Draft all roads with a double-line symbol to allow for easier road interpretation and black-and-white reproduction;
2. Subdue (screen back) contours on new and reprinted maps;
3. Bring road classification into alignment with other agencies;
4. Add foot designations to metric spot elevations;
5. Add High Accuracy Reference Network (HARN) monument locations to the maps; and
6. Complete compilation of the remaining contour plates for Idaho quadrangles.

Finally, IGIAC recommends the following specific changes in the USGS 1:24,000 scale digital mapping program:

1. Modify the PLSS data on DLG's so that the shorelines of water bodies are the approximate closure lines of the PLSS;
2. Compile flow direction, velocity, and connectivity for hydrographic data; and
3. Continue to cooperatively revise quadrangles with the US Forest Service.

## **Idaho Geographic Information Advisory Committee Metadata Standard Version 3.0**

### **Approved January 28, 1994**

The Idaho Geographic Information Advisory Committee (IGIAC) Metadata Standard was compiled by the IGIAC Metadata Subcommittee from January through October of 1993. The Standard provides a common set of identifiers for organizations in Idaho exchanging spatial data sets and keeping track of their data.

The content and format closely mimics the draft Federal standard (FGDC 1992b) which was created, in part, to support the goals of the Spatial Data Transfer Standard (SDTS; U.S.G.S. 1990). It also borrows some from the Florida (FGDC 1992a) and Texas models (TGISSC 1992).

**How to use the Standard:** The Metadata Subcommittee has created a paper metadata form for users to fill out for their spatial data sets. Also, the Subcommittee over the next year, as well as any interested users, will develop interfaces to several, popular databases and GISs for maintenance of metadata on their computers. This document is intended to explain each of the elements in the Standard, provide examples of their use, and briefly describe the form that they should take in a database.

The Standard is organized at two levels: sections and elements. At the broadest level, there are ten sections that break down data documentation into general categories, i.e., projection information, the data dictionary (attribute info), and source information, to name a few. Elements address specific properties which pertain to a section. For example, within the "projection information" section there are elements entailing the projection name, horizontal datum, projection units, etc. The Standard contains 72 elements.

Some elements as well as entire sections may be repeated where required. The data dictionary section is a case in point. The whole section is repeated for *each* database associated with a spatial data set; and within the section, subsection "B" is repeated when documenting each field in the database. In terms of filling out the paper form, the repetitive sections are on pages that can be photocopied where necessary and repetitive elements are listed a sufficient number of times to cover most documentation situations. Digital metadata interfaces to databases and GIS's should handle repetitive sections and elements internally.

**Where to get assistance:** Should a user require assistance when filling out a metadata document they can contact any member of the IGIAC Metadata Subcommittee listed after References at the end of this Standard.

#### **Notes on symbology and terms used throughout the Standard**

- \* - element/section repeated as many times as required
- # - element/section to be used in brief description of data set, i.e. for data cataloging or in a data clearinghouse (listed in the Appendix A)
- & - element not in draft Federal standard
- ( ) - element requirement parameter: required or optional
- [ ] - corresponding element in the draft Federal standard
- Type - database element type (text, integer, real, date, etc.)
- Example - an example of the element

#### **I. Identification section**

**#Data set description** (required): a text description of the spatial data set

Example: 100K Preston PLSS from USGS DLG files

**#\*Theme keywords** (required for data catalogue): common-use terms used to describe the theme of a spatial data set (use terms from NWLISN list in Appendix C wherever possible)

Examples: DLG, 100K, sections

**#\*Geographic area** (required for data catalogue): the names of significant areas and/or places that fall within the extent of the spatial data set

Example: Preston 100K quad, SE Idaho, Bear Lake County

**#Map extent** (required): the limits of coverage of a data set expressed in a minimum latitude and longitude rectangle [data set extent]

Example: 42.00, -112.00, 42.50, -111.00 NAS (for North American 1927 Datum; use domain from SDTS in Appendix D)

**#Intended use** (required): synopsis of the purpose(s) or application(s) for which a data set was created; of equal importance, the definition should summarize or reference metadata elements that will aid the user in determining *limitations* of the data set that might result in misuse of the data

Example: The data do not represent legally defined boundaries.

**#Intended scale** (required): the scale at which the data can most accurately be applied

Example: 100000

**#Resolution of data** (required where appropriate): the dimension of the smallest resolvable polygon or the minimum mapping unit (MMU), in the data set

Example: 10 acres

**#Data structure** (required): the data structure used to represent mapped features in the product [representation model]

Example: vector

**#\*Spatial object type** (required): the name of a spatial object type included in the data set (use SDTS domain of object types from Appendix D)

Example: node, chain, GT-polygon

**File name** (required): data set file name assigned by the custodian [data set identity]

Example: PRESPLS

**&Project name** (optional): name of the project that the data set is intended for; usually for internal use of the data set by the data custodian

Example: PLSS & ownership update

**#Software and version** (required where appropriate): computer software format that the data set is maintained in

Type: text

Example: ARC/INFO 6.1.1

**#Computer type and operating system** (required where appropriate): the brand name of the computer and operating system from which the data set is available

Type: text

Example: DECStation 5000/240, Ultrix 5.42C

## **II. Projection information**

**#Projection name** (required): the name of the projection coordinate system in which the source was mapped

Type: text

Example: UTM

**Horizontal datum or ellipsoid** (required): the name of a set of constants specifying the coordinate systems used for geodetic control

Type: text

Example: NAS

**Vertical datum** (required): reference surface for the third component of spatial coordinates

Type: text

Example: NAS (use SDTS domain of datums from Appendix D)

**Projection Units** (required): the units in which measurements on the map are given or in which a digital map is stored

Type: text

Example: meters

**Zone** (required where appropriate): the number of the zone used in the State Plane Coordinate System (SPCS) and Universal Transverse Mercator (UTM)

Type: text and integer

Example: 12

**1st standard parallel** (required where appropriate): first, usually southernmost, line of latitude where the cone of projection is tangent to the spheroid of the projection [\*standard parallel]

Type: real

Example: 33.00

**2nd standard parallel** (required where appropriate): second, usually northernmost, line of latitude where the cone of projection is tangent to the spheroid of the projection [\*standard parallel]

Type: real

Example: 45.00

**Central meridian** (required where appropriate): the line of longitude that is in the center of the map from which coordinates to the right are positive and to the left are negative [longitude of central meridian]

Type: real

Example: -114.00

**Latitude of projection's origin** (required where appropriate): the line of latitude in a conic projection at which Y-coordinates are measured north from

Type: real

Example: 42.00

**&X-shift** (required): the constant added to the input X-coordinate, or easting, often to maintain coordinate precision

Type: real

Example: 0.0

**&Y-shift** (required): the constant added to the input Y-coordinate, or northing, often to maintain coordinate precision

Type: real

Example: -4000000.0

**&False easting** (required where appropriate): the X-coordinate value, or easting, assigned to the point where the projection's latitude of origin and central meridian intersect; default is 0.0

Type: real

Example: 100000.0

**&False northing** (required where appropriate): the Y-coordinate value, or northing, assigned to the point where the projection's latitude of origin and central meridian intersect; default is 0.0

Type: real

Example: 500000.0

**#Coordinate precision** (required): the precision with which object coordinates are managed or maintained in the native software system and which are to be expected in the transfer

Type: text

Example: single

### **#III. Data custodian information**

**Contact person & title** (required): the name(s) and title(s) of individual(s) who currently hold the data set

Type: text

Example: Robert Harmon, Senior GIS Analyst

**Contact organization** (required): the name of the organization acting as custodian of the data

Type: text

Example: Idaho Department of Water Resources

**Contact address, tel. #, & FAX #** (required): the address, and telephone and FAX numbers of the contact identity [contact mailing address, contact telephone, contact fax number]

Type: text

Example: 1301 N. Orchard St.  
Boise, ID 83706-2237  
Tel. (208)327-7900  
FAX (208)327-7866

### **\*IV. Data dictionary**

The Data Dictionary section is designed to document the contents of each table or database associated with the data set described in the metadata document. Subsection A., Table Elements, briefly describes a single table or database. Subsection B., Attribute Elements, describes and is repeated, in its entirety, for each field in the table or database listed in subsection A.

NOTE: Only those tables and fields created or altered by the user need to be documented. For example, the ARC/INFO GIS software creates a set of standard databases and fields with each coverage that are updated through processing and shouldn't be changed by the user. Since they are also self-explanatory in their intent, documentation is not needed.

## **A. Table elements**

**Table identity** (required): the identity or label associated with a database or table in a logical data model, assigned by the owner

Type: text

Example: PRESPLS.PAT

**Table definition** (required): a short description of the database

Type: text

Example: polygon attribute table

## **\*B. Attribute elements**

**Attribute identity** (required): the database label associated with an attribute

Type: text

Example: TDIR

**Attribute definition** (required): the definition of the attribute label

Type: text

Example: township direction from the base meridian

**Attribute definition source** (required): the source from which the attribute definition was obtained

Type: text

Example: derived from DLG Major/Minor codes, 'USGS DLG-3 User Guide, 1987'

**Attribute domain value** (required): the valid values for a given attribute or citation for the source of values

Type: text

Example: E, W

**Attribute format type** (required): the computer representation of the attribute

Type: text

Example: character

**Attribute format length** (required): the maximum number of bytes used to represent the attribute

Type: integer

Example: 2

**Attribute significant digits** (required where appropriate): the number of digits starting at the leftmost digit to which a given value of an attribute maintains accuracy

Type: integer

Example: 3 (would preserve the number 3.1416 as 3.14)

**Attribute units of measure** (required): the units of measure explicitly associated with all instances of this attribute

Type: text

Example: meters

## **\*V. Source information**

**\*&Source contact** (required): the name(s) of individual(s) who have previously held the data set and other relevant contact information

Type: text

Example: Robert Harmon, IDWR--Boise, 208-327-7900

**#Source name** (required): brief descriptive name of the source material

Type: text

Example: surface management map of the 100K Preston quad

**Source description** (required): description of the source material [bibliographic reference]

Type: text

Example: surface management, or coarse ownership, is broken down by Federal agency, State ownership is grouped together as well as private ownership

**#Source date** (required): date for which the data represented in data set is valid [date of source materials]

Type: integer

Example: 1978

**#Source scale** (required): scale of source material

Type: integer

Example: 100000

**Source projection** (required): the name and parameters of the projection of the source material

Type: text

Example: UTM, Zone 12

**Source medium** (required): the medium on which source was prepared or from which a digital spatial data set was digitized

Type: text

Example: paper

**Medium condition** (required where appropriate): a qualitative statement regarding the condition of the medium; may not be necessary in where the source is a digital file

Type: text

Example: a flat map in good condition

#### **\*VI. Processing steps**

**Procedure** (required): a processing step such as the execution of a software command, a user-written program, or other task that may affect the content and/or quality of the data prior to or during automation; if the processing step includes a transformation, i.e. during digitizing, then the type and error (root mean square error) shall be reported

Type: text

Example: paper base map was registered to an Hitachi 3648S Digitizing tablet using an affine transformation into the UTM coord. system; RMS was 0.002; arcs digitized into coverage through pcARC/INFO 3.4D+ ARCEDIT

**Procedure tolerance(s)** (required): a description of any processing tolerances applied in this processing step

Type: text

Example: snap distance was 15 meters and SNAPTYPE set to CLOSEST

**Procedure date** (required): date that procedure was conducted

Type: date

Example: 1/14/93

**Procedure contact & organization** (required): the identity of the individual or organization responsible for the execution of the specified procedure

Type: name & organization

Example: Robert Harmon, IDWR

**Data set version number** (optional): the unique version number of the data set that relates directly to the completion of a specified procedure or project

Type: text

Example: 2.0

## **VII. Data quality**

**Positional accuracy** (optional): the absolute measure of error referenced in the units of the coordinate system

Type: text and real

Example: +/- 55

**#Positional accuracy explanation** (required): a text explanation of how the method was applied to determine an estimate of positional accuracy

Type: text

Example: comparison of plotted linework and polygon attributes to mylar of quad; all line-work was checked against the map

**Attribute accuracy** (optional): a measure of the confidence with which features are correctly portrayed in the data set, usually represented as a percentage

Type: integer

Example: 99

**#Attribute accuracy explanation** (required): a text explanation of how the method was applied to determine an estimate of attribute accuracy

Type: text

Example: all polygon attributes were checked against corresponding data on an acetate of the quad map

**#Data model integrity** (required): a text explanation of the integrity of the relationships between geometric objects in the data set, and any topological tests run

Type: text

Example: data set is topologically-structured polygon data with nodes at all intersections (ARC BUILD)

**#Completeness** (required): information about selection criteria, definitions used, and other relevant mapping rules that were used to derive the data set in analog or digital form

Type: text

Example1: all wetlands compiled whose areal extent exceeds 50 hectares were included; features less than 100 meters wide were not included

Example2: all paved roads from county through Federal designations

## **VIII. Metadata reference section**

**&Metadata creation date** (required): the date that metadata document was created

Type: date

Example: 1/14/93

**Metadata revision date** (required): the date that latest (current) version of metadata document was compiled

Type: date

Example: 1/15/93

## **#IX. Access information**

**Transfer format** (required for data catalogue): the name of the digital data transfer format to be associated with a data transfer size

Type: text

Example1: ARC/INFO EXPORT

## Example2: DLG-3 Optional

**Transfer size** (required for data catalogue): the size in megabytes of the digital data set in a specified transfer format

Type: real (with one decimal place)

Examples: 90.1, 4.2

**\*Transfer mode** (required for data catalogue): the mechanism by which users may acquire the data set in a transfer format

Type: text

Examples: tape, diskette, modem

**\*Transfer instructions** (required for data catalogue): a specific description of each transfer mode available

Type: text

Example1: 1.3 gigabyte 4mm DAT CBU cartridge tape in UNIX tar format

Example2: 1.44 Meg 3.5" diskette in UNIX tar format

Example3: 1.44 Meg 3.5" diskette in DOS 5.0 format

## #X. Status information

**Degree of digital completion** (required): the entire range of steps from data collection through conversion, edit, structuring, and review that have been accomplished for the entire spatial extent intended for the data set

Type: text

Examples: complete, partial

**Percentage complete** (required): a description of one or more levels of completion with an estimated percentage of coverage at each level of completion

Type: text

Example1: 70% of data set through final review and editing

Example2: 60% of data set through digital conversion

**Completion date** (required): the date by which the processing of the spatial data set is expected to be or was completed in extent and processing

Type: date

Examples: 1/90, 2/14/90

**Degree of availability** (required for data catalogue): the portion of the existing completed data which are available for distribution

Type: text

Example: partially available

**Distribution policy** (required for data catalogue) a description of distribution and ownership policy as provided by the custodian [policy status]

Type: text

Example: data are available under the provisions of the Idaho Open Records Law

**Copyright status** (required for data catalogue): whether the data are in the public domain or are copyrighted with some type of restriction on usage

Type: text

Example: public domain

**Custodial liability** (required for data catalogue): the liability of the custodian related to the quality and use of the data set

Type: text

Example: Custodian does not assume liability

## **References**

Federal Geographic Data Committee (FGDC). 1992a. Information Exchange Forum on Spatial Metadata June 16-18, 1992. U.S.G.S.

FGDC. 1992b. Draft Content Standards for Spatial Metadata. U.S.G.S.

Texas GIS Standards Committee (TGISSC). 1992. Standards and Guidelines for GIS in the State of Texas. Austin, TX: Dept. of Information Resources.

U.S.G.S.. 1990. Spatial Data Transfer Standard (SDTS).

Vrana, Ric, et. al. 1992. NWLISN Spatial Data Index Project. Portland State University.

## I. Identification Section

Data Set Description \_\_\_\_\_  
Theme Keywords \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_, \_\_\_\_\_  
Geographic Area \_\_\_\_\_  
Map Extent S \_\_\_\_\_ W - \_\_\_\_\_ N \_\_\_\_\_ E - \_\_\_\_\_  
Intended Use \_\_\_\_\_  
Intended Scale (circle one) 1:24,000 1:100,000 1:250,00 1:500,000 Other \_\_\_\_\_  
Resolution of Data (MMU) \_\_\_\_\_ Data Structure (circle one) RASTER VECTOR  
Spatial Object Type \_\_\_\_\_  
File Name \_\_\_\_\_ Project Name \_\_\_\_\_  
Software and Version \_\_\_\_\_ Computer Type and OS \_\_\_\_\_

## II. Projection Information

Projection Name \_\_\_\_\_ Horizontal Datum or Ellipsoid \_\_\_\_\_  
Vertical Datum \_\_\_\_\_ Projection Units \_\_\_\_\_ Zone \_\_\_\_\_  
1st Std. Par. \_\_\_\_\_ 2nd Std. Par. \_\_\_\_\_ Central Merid. - \_\_\_\_\_  
Lat. of Proj. Origin \_\_\_\_\_ X-Shift \_\_\_\_\_ Y-Shift \_\_\_\_\_  
False East. \_\_\_\_\_ False North. \_\_\_\_\_ Coord. Precision SINGLE DOUBLE

## III. Data Custodian Information

Contact Person and Title \_\_\_\_\_  
Organization \_\_\_\_\_  
Address \_\_\_\_\_  
Phone (\_\_\_\_\_) \_\_\_\_\_ - \_\_\_\_\_ Fax (\_\_\_\_\_) \_\_\_\_\_ - \_\_\_\_\_

## V. Source Information

Source Name \_\_\_\_\_ Source Date \_\_\_\_\_ Source Scale \_\_\_\_\_  
Source Name \_\_\_\_\_ Source Date \_\_\_\_\_ Source Scale \_\_\_\_\_  
Source Name \_\_\_\_\_ Source Date \_\_\_\_\_ Source Scale \_\_\_\_\_

## VII. Data Quality

Positional Accuracy \_\_\_\_\_ Attribute Accuracy \_\_\_\_\_  
Positional Accuracy Explanation \_\_\_\_\_  
Attribute Accuracy Explanation \_\_\_\_\_  
Data Model Integrity \_\_\_\_\_  
Completeness \_\_\_\_\_

## VIII. Metadata Reference Section

Metadata Creation Date \_\_\_\_\_ Metadata Revision Date \_\_\_\_\_

## IX. Access Information

Transfer Format \_\_\_\_\_ Transfer Size \_\_\_\_\_ Transfer Modes \_\_\_\_\_  
Transfer Instructions \_\_\_\_\_

## X. Status Information

Degree of Digital Completion (circle one) PARTIAL COMPLETE Percent Complete \_\_\_\_\_  
Completion Date \_\_\_\_\_ Degree of Availability (circle one) NONE PARTIAL ALL  
Distribution Policy \_\_\_\_\_  
Copyright Status (circle one) PUBLIC RESTRICTED  
Custodial Liability \_\_\_\_\_

#### IV. Data Dictionary (Repeat for each associated table or database)

##### A. Table Element

Identity (File Name) \_\_\_\_\_

Description \_\_\_\_\_

##### B. Attribute Elements

Identity (Attribute Name) \_\_\_\_\_

Description \_\_\_\_\_

Definition Source \_\_\_\_\_

Domain Value \_\_\_\_\_

Format Type \_\_\_\_\_ Format Length \_\_\_\_\_ Significant Digits \_\_\_\_\_ Units \_\_\_\_\_

Identity (Attribute Name) \_\_\_\_\_

Description \_\_\_\_\_

Definition Source \_\_\_\_\_

Domain Value \_\_\_\_\_

Format Type \_\_\_\_\_ Format Length \_\_\_\_\_ Significant Digits \_\_\_\_\_ Units \_\_\_\_\_

Identity (Attribute Name) \_\_\_\_\_

Description \_\_\_\_\_

Definition Source \_\_\_\_\_

Domain Value \_\_\_\_\_

Format Type \_\_\_\_\_ Format Length \_\_\_\_\_ Significant Digits \_\_\_\_\_ Units \_\_\_\_\_

Identity (Attribute Name) \_\_\_\_\_

Description \_\_\_\_\_

Definition Source \_\_\_\_\_

Domain Value \_\_\_\_\_

Format Type \_\_\_\_\_ Format Length \_\_\_\_\_ Significant Digits \_\_\_\_\_ Units \_\_\_\_\_

Identity (Attribute Name) \_\_\_\_\_

Description \_\_\_\_\_

Definition Source \_\_\_\_\_

Domain Value \_\_\_\_\_

Format Type \_\_\_\_\_ Format Length \_\_\_\_\_ Significant Digits \_\_\_\_\_ Units \_\_\_\_\_

Identity (Attribute Name) \_\_\_\_\_

Description \_\_\_\_\_

Definition Source \_\_\_\_\_

Domain Value \_\_\_\_\_

Format Type \_\_\_\_\_ Format Length \_\_\_\_\_ Significant Digits \_\_\_\_\_ Units \_\_\_\_\_

**V. Source Information (Repeat for each source used)**

Source Contact Name \_\_\_\_\_  
Address \_\_\_\_\_ Phone \_\_\_\_\_  
Source Name \_\_\_\_\_  
Description \_\_\_\_\_  
Date \_\_\_\_\_ Scale \_\_\_\_\_ Projection \_\_\_\_\_  
Medium \_\_\_\_\_ Condition \_\_\_\_\_

Source Contact Name \_\_\_\_\_  
Address \_\_\_\_\_ Phone \_\_\_\_\_  
Source Name \_\_\_\_\_  
Description \_\_\_\_\_  
Date \_\_\_\_\_ Scale \_\_\_\_\_ Projection \_\_\_\_\_  
Medium \_\_\_\_\_ Condition \_\_\_\_\_

Source Contact Name \_\_\_\_\_  
Address \_\_\_\_\_ Phone \_\_\_\_\_  
Source Name \_\_\_\_\_  
Description \_\_\_\_\_  
Date \_\_\_\_\_ Scale \_\_\_\_\_ Projection \_\_\_\_\_  
Medium \_\_\_\_\_ Condition \_\_\_\_\_

Source Contact Name \_\_\_\_\_  
Address \_\_\_\_\_ Phone \_\_\_\_\_  
Source Name \_\_\_\_\_  
Description \_\_\_\_\_  
Date \_\_\_\_\_ Scale \_\_\_\_\_ Projection \_\_\_\_\_  
Medium \_\_\_\_\_ Condition \_\_\_\_\_

Source Contact Name \_\_\_\_\_  
Address \_\_\_\_\_ Phone \_\_\_\_\_  
Source Name \_\_\_\_\_  
Description \_\_\_\_\_  
Date \_\_\_\_\_ Scale \_\_\_\_\_ Projection \_\_\_\_\_  
Medium \_\_\_\_\_ Condition \_\_\_\_\_

Source Contact Name \_\_\_\_\_  
Address \_\_\_\_\_ Phone \_\_\_\_\_  
Source Name \_\_\_\_\_  
Description \_\_\_\_\_  
Date \_\_\_\_\_ Scale \_\_\_\_\_ Projection \_\_\_\_\_  
Medium \_\_\_\_\_ Condition \_\_\_\_\_

## VI. Processing Steps (Repeat for each processing step)

Procedure \_\_\_\_\_  
Tolerances \_\_\_\_\_  
Date \_\_\_\_\_ Date Set Version Number \_\_\_\_\_  
Contact: Name \_\_\_\_\_  
Address \_\_\_\_\_ Phone \_\_\_\_\_

Procedure \_\_\_\_\_  
Tolerances \_\_\_\_\_  
Date \_\_\_\_\_ Date Set Version Number \_\_\_\_\_  
Contact: Name \_\_\_\_\_  
Address \_\_\_\_\_ Phone \_\_\_\_\_

Procedure \_\_\_\_\_  
Tolerances \_\_\_\_\_  
Date \_\_\_\_\_ Date Set Version Number \_\_\_\_\_  
Contact: Name \_\_\_\_\_  
Address \_\_\_\_\_ Phone \_\_\_\_\_

Procedure \_\_\_\_\_  
Tolerances \_\_\_\_\_  
Date \_\_\_\_\_ Date Set Version Number \_\_\_\_\_  
Contact: Name \_\_\_\_\_  
Address \_\_\_\_\_ Phone \_\_\_\_\_

Procedure \_\_\_\_\_  
Tolerances \_\_\_\_\_  
Date \_\_\_\_\_ Date Set Version Number \_\_\_\_\_  
Contact: Name \_\_\_\_\_  
Address \_\_\_\_\_ Phone \_\_\_\_\_

Procedure \_\_\_\_\_  
Tolerances \_\_\_\_\_  
Date \_\_\_\_\_ Date Set Version Number \_\_\_\_\_  
Contact: Name \_\_\_\_\_  
Address \_\_\_\_\_ Phone \_\_\_\_\_

Procedure \_\_\_\_\_  
Tolerances \_\_\_\_\_  
Date \_\_\_\_\_ Date Set Version Number \_\_\_\_\_  
Contact: Name \_\_\_\_\_  
Address \_\_\_\_\_ Phone \_\_\_\_\_

# Guidelines for Resource Grade GPS Coordinate Accuracy

Adopted October 12, 1994 Version 1.1

The following guidelines are considered to be the minimum requirements necessary to achieve the specified level of accuracy. Each resource/program specialist will have to determine their own Global Position System (GPS) accuracy requirements. In addition the manufacturer's instructions for the specific GPS unit in use should be followed.

## I. Terminology

**Base (reference, control) Station:** A GPS receiver set up at a known location.

**CEP (circular error probable):** Statistical measure of accuracy; it implies the probability that 50 percent of the positions obtained will fall within a circle of the specified radius. Generally speaking, the accuracies mentioned below refer to CEP.

Note: Five meter CEP accuracy at the 50 percent confidence level converts approximately to a circle of nine meter radius at the 90 percent confidence level. This is nearly 30 feet and we are considering horizontal accuracy only. The vertical accuracy of resource grade GPS receivers is up to two times worse than the horizontal accuracy. National Map Accuracy standards require that 90 percent of the points tested on a 1:24,000-scale map should not be in error by more than 40 feet. So, 2-5 meter CEP does meet the National Map Accuracy standards for 1:24,000-scale mapping but not by nearly as much as it first sounds.

**Datum, Geodetic:** A set of constants specifying the coordinate system used for geodetic control, i.e., for calculating coordinates of points on the earth. At least eight constants are needed to form a complete datum: three to specify the location of the origin of the coordinate system, three to specify the orientation of the coordinate system, and two to specify the dimensions of the reference ellipsoid.

**Dilution of Precision (DOP):** A description of the uncertainty in a position fix can be described by several indicators. The more commonly used indicators are as follows:

GDOP Geometric (three position coordinates plus the clock offset in the solution)

PDOP Position (three coordinates)

HDOP Horizontal (two horizontal coordinates)

VDOP Vertical (height only)

TDOP Time (clock offset only)

RDOP Relative (normalized to 60 seconds)

**Ellipsoid:** In geodesy, unless otherwise specified, a mathematical figure formed by revolving an ellipse about its minor axis. It is often used interchangeably with spheroid.

**Ellipsoidal Height (HAE):** The measure of vertical distance above the ellipsoid. Not the same as elevation above sea level. GPS receivers output position-fix height in the WGS-84 datum.

**Elevation Mask Angle:** That angle below which it is recommended that satellite's not be tracked. Normally set to a minimum of 10 degrees to avoid interference problems caused by buildings and trees and multipath errors.

**Multipath:** A term used to describe the effect caused by satellite signals reflecting off surfaces near the GPS receiver. This reflected signal is received along with the original signal and is a major contributor to error in GPS and cannot be corrected by differential correction.

**PDOP (Position Dilution of Precision):** PDOP is an indicator of the satellite's geometry in relation to the user's GPS receiver location. The smaller the number the better the geometry; therefore, the better the position.

**Resource (navigation) grade receiver:** A receiver that uses information in the satellites signal to calculate position. Examples of this type of receiver include the Trimble Pathfinder series, Magellan NAV PRO series and the Ashtech Ranger series.

**Rover (remote) Station:** A GPS receiver set up at an unknown location.

**Selective Availability (SA):** A Department of Defense program to control the accuracy of pseudo-range measurements, whereby the user receives a false pseudo-range which is in error by a controlled amount. Differential GPS techniques can reduce these effects for local applications.

**SEP (spherical error probable):** Statistical measure of accuracy; implies that at least 50 percent of the position fixes will fall within a sphere of the specified radius.

**Survey (Geodetic) grade receiver:** A receiver that uses the satellite's signal itself to calculate position. Examples of this type of receiver include the Trimble 4000 series, Ashtech M-XII series, Wild System 200 series and the Motorola Eagle.

**Three-Dimensional GPS Data (3D Data):** GPS data giving latitude, longitude and height of a point. (A minimum of four satellites must be tracked to obtain 3D Data.)

**Two-Dimensional GPS Data (2D Data):** GPS data giving only latitude and longitude position fixes using an estimated height. Since latitude and longitude are computed based upon the estimated height, the error of the horizontal position can be as much as twice the error in the height. This error is not removed by differential corrections to a base station, so 2D data is inherently more inaccurate than 3D data. (A minimum of three satellites must be tracked to obtain 2D data.)

**User Range Accuracy (URA):** 1) is an indicator that can be used to determine whether or not Selective Availability has been activated. A high URA (30 or above) is a good indicator of SA activation [Trimble], and 2) is a qualitative number showing the range accuracy of each satellite. The lower the number, the better the accuracy (0 indicates best accuracy: 8 or above means questionable accuracy - use at your own risk!) [Ashtech].

## II. Definitions of collection methods:

A. **Static Absolute** - Uses only one receiver, accuracy can range from 25 to 100 meters spherical error probable (SEP) depending on the quality of the orbital data. Results are obtained in the field.

B. **Static Relative** - Uses two or more receivers one of which must be on a position with known geodetic coordinates, accuracy can range from less than one centimeter (cm) to five meters depending upon the equipment used and the length of time on each station. All receivers track the same satellite signals. Resource Grade GPS receivers can obtain accuracies from two to five meters CEP. Requires post processing of data.

C. **Kinematic Absolute** - Uses only one receiver that keeps moving, records positions at a selected rate, accuracy can range from 25 to 100 meters SEP depending on the quality of the orbital data. Results are obtained in the field. This method can be used to obtain a large amount of relatively low accuracy coordinates by mounting the unit to any moving platform.

D. **Kinematic Relative** - Uses two or more receivers, one of which must be on a position with known geodetic coordinates, (i.e., base or reference) while the other(s) (i.e., rover or remote) move to or along unknown positions. All receivers track the same satellite signals. Accuracy can range from less than one cm to five meters depending on the grade of the receiver, and the procedure used. Resource Grade GPS receivers can obtain accuracies from two to five meters CEP.

1. **Real Time Kinematic.** This method requires the receivers to have a communication link between them. All receivers track the same satellite signals. The results are obtained in the field. A lock on the satellites as well as the communication link must be maintained by the receivers at all times or the data would not be reliable for the positions obtained during the loss of the signals. Accuracy can range from two to five meters CEP.

2. **Low Accuracy Kinematic.** This method is quite similar to the Real Time Kinematic method with the exception of the communication link and the fact that the data collected must be post processed. This method seems to be the most viable for many LIS related applications; coordinates obtained on corners of the Public Land Survey using this method could be incorporated into the geographic-coordinates database (GCDB). Accuracy can range from 2 to 5 meters CEP.

3. **High Accuracy Kinematic.** This method makes use of survey grade receivers. The important differences between this method and other kinematic methods are, 1) the rover must become stationary at the unknown station for at least three minutes, 2) the rover must occupy every unknown station at least twice, 3) all receivers must maintain continuous lock on at least four satellites, all of which must be the same for each receiver, and 4) if the rover loses lock it must return to the last occupied station and resume data collection. The data collected must be post processed. Accuracy can range from 1 to 5 cm.

## III. Procedures

A. Accuracies of **less than two meters** may be obtained using survey grade GPS equipment. These guidelines are for resource grade GPS equipment and do not intend to cover the more accurate applications.

B. To achieve an accuracy of **one to five meters CEP** the following minimum requirements must

be true.

1. Two or more resource grade receivers must be used with either static relative or kinematic relative methods. The receivers must be able to be differentially corrected. Multi-channel receivers with once per second update rate must be used in high dynamic situations, such as data collecting from aircraft or moving vehicle.
2. The roving receiver(s) must be differentially corrected against another receiver (i.e., base) which is on a station the position of which is known to be accurate to one meter or better.
3. For point positioning, at least three minutes at a one second collection rate (i.e., 180 positions recorded) must be spent on each station, and the PDOP value must remain below six.
4. It is recommended that you re-occupy each unknown point for another three minute observation, or retrace your route, at a different time period. Another option would be to move the rover to a position with known coordinates once every hour. This would show the level of repeatability in your coordinates relative to the previous observation and give you a better idea of the accuracy of the coordinates.

C. To achieve an accuracy of **less than 25 meters CEP** the following minimum requirements must be true.

1. Only one resource or survey grade receiver is necessary and any autonomous method can be used.
2. Selective Availability (SA), which is a term used by the Defense Department to refer to the period of time when the signals from the satellites will be intentionally degraded, must not be in effect. **\*\*Note\*\*** Check your GPS equipment manual for the specific method recommended by the vendor to determine if SA has been activated. Methods, values, and terminology vary by vendor. The most common term to date is User Range Accuracy (URA). According to the Defense Department selective availability was reactivated in July of 1991 and will remain in effect until further notice. The level of its effect may change from time to time and anyone attempting to use GPS in autonomous mode should be aware that the accuracy may be different at different times and may change depending on what satellites are being observed. The only safe thing is to assume that when SA is activated you will not get an accuracy better than 100 meters in autonomous mode.
3. PDOP should remain below six.

D. If an accuracy of no better than **100 meters** is all that is desired, the following minimum requirements must be true.

Any resource or survey grade GPS unit used in any of the methods listed in section I. above.

The accuracies indicated above refer to a Circular Error Probable (CEP) which indicates that at least 50 percent of the coordinates obtained will fall within a circle of that radius 50 percent of the coordinates will fall outside that circle. For instance, if you set on a station for three minutes and your receiver gets a reading every second then at least 90 of the coordinates for that station will be within the circle. In addition, CEP refers to horizontal or two dimensional accuracy only. See discussion under CEP in definitions above.

#### IV. Final Product

In addition to the above requirements, the following information about the coordinate values must be recorded.

A. Which horizontal datum are the values recorded in:

1. NAD27 - North American Datum of 1927. Most information, including USGS topographic maps, are based on this datum.
2. NAD83 - North American Datum of 1983. GPS is actually using the World Geodetic System of 1984 (WGS84). There is very little difference between NAD83 and WGS84, and for the purpose of resource grade GPS and most survey grade GPS projects the WGS84 values can be used directly as NAD83 values.

Software is available to convert (or transform) from one datum to another. The accuracy of these conversions varies with the amount of control available and the conversion program used. The difference between datums can be as high as 300 meters. Some GPS units come with conversion software, but be careful when using this software as it is usually based on a very large area and can degrade the accuracy of your coordinates. A transformation program put out by the National Geodetic Survey (NGS) called "NADCON" or one based on this program put out by the U.S. Army Corps of Engineers called "CORPSCON" is recommended and is available through NGS.

B. Which vertical datum if any are the elevations recorded in:

1. NGVD 29 - National Geodetic Vertical Datum of 1929.
2. NAVD 88 - North American Vertical Datum of 1988.

C. What Geoid Modeling Software was used if elevations are given:

1. Vendor supplied. (Which Vendor?)
2. Geoid 93 or Geoid 90, obtained from NGS.

D. What format are the coordinates in:

1. LATITUDE AND LONGITUDE - This can be either NAD27 or NAD83. Coordinates should be in degrees, minutes, seconds, and decimal of seconds. If not, please specify.
2. UTM - Universal Transverse Mercator Coordinates should be in meters, if not specify the units.
3. SPC - State Plane Coordinates. If the State Plane coordinates are reported on the NAD27 datum, they should be in feet; if they are reported on the NAD83 datum, they should be in meters. If not specify the units.
4. IDTM - Idaho Transverse Mercator. Meters are to be used for both NAD27 and NAD83 datums.

## **GPS RECORDING FORM**

NAME OF OPERATOR: \_\_\_\_\_ DATE: \_\_\_\_\_ PROJECT: \_\_\_\_\_ COMPANY  
NAME: \_\_\_\_\_ COUNTY: \_\_\_\_\_ DESCRIPTION of PROJECT: \_\_\_\_\_

HORIZONTAL COORDINATE OF POINT (Attach list if appropriate): \_\_\_\_\_

VERTICAL COORDINATE OF POINT

(Specify HAE or MSL): \_\_\_\_\_ NAME AND MODEL OF RECEIVER: \_\_\_\_\_

POST PROCESSING SOFTWARE AND VERSION: \_\_\_\_\_

TRANSFORMATION SOFTWARE AND VERSION: \_\_\_\_\_ GEOID

MODELING SOFTWARE AND VERSION: \_\_\_\_\_

NAME(s) OF CONTROL or BASE STATION(s) USED (Provide NAD 83 values):

#1 \_\_\_\_\_ LAT: \_\_\_\_° \_\_\_\_' \_\_\_\_" LONG: \_\_\_\_° \_\_\_\_' \_\_\_\_" HAE: \_\_\_\_\_ MSL: \_\_\_\_\_

#2 \_\_\_\_\_ LAT: \_\_\_\_° \_\_\_\_' \_\_\_\_" LONG: \_\_\_\_° \_\_\_\_' \_\_\_\_" HAE: \_\_\_\_\_ MSL: \_\_\_\_\_

#3 \_\_\_\_\_ LAT: \_\_\_\_° \_\_\_\_' \_\_\_\_" LONG: \_\_\_\_° \_\_\_\_' \_\_\_\_" HAE: \_\_\_\_\_ MSL: \_\_\_\_\_

HORIZONTAL DATUM	VERTICAL DATUM	FORMAT	METHOD	PLATFORM	TIME	RELIABILITY
1. NAD27	1. NGVD 29	1. LAT & LONG	1. STATIC AUTONOMOUS	A. AIRBORNE VEHICLE	A. AUTONO- MOUS	1. < 2 METERS
2. NAD83	2. NAVD 88	2. UTM	2. STATIC RELATIVE	L. LAND VEHICLE	B. POST PROCESSED	2. 2-5 METERS
	3. N/A (HAE)	3. SPC	3. KINEMATIC AUTONOMOUS	M. MARINE VEHICLE	C. REAL TIME COMM LINK	3. < 25 METERS
		4. IDTM	4. KINEMATIC RELATIVE	P. PORTABLE		4. ± 100 METERS
CODE: _	-	-	-	-	-	-

EXAMPLE CODE:

1 1 1 2 P B 2  
NAD27 NGVD 29 LAT & LONG STATIC RELATIVE PORTABLE POST PROCESSED 2-5 METERS

# **IGIAC POLICY ON PLANE COORDINATE SYSTEM FOR STATE-WIDE GEOGRAPHIC INFORMATION SYSTEMS**

**Adopted October 12, 1994**

As digital data for Idaho becomes increasingly available, there is more frequent opportunity and need to use these data for GIS analysis and applications that cover the entire state. Digitized map data from the US Geological Survey and other federal sources often are furnished in the Universal Transverse Mercator (UTM) coordinate system. This system splits Idaho into two zones, making it necessary to reproject data into a common system for state-wide coverage. If one of the existing UTM zones is selected excessive distortion and scale error can adversely affect results of GIS analysis. Other existing coordinate systems for the state also present this problem.

A coordinate system tailored to Idaho is needed for applications that cover the entire state, to provide acceptable accuracies without excessive distortion, and to permit 0.1 meter resolution in single precision with no more than seven digits. The Idaho Transverse Mercator coordinate system (IDTM) is designed to meet these requirements (Gem State Surveyor, Winter 1993).

The IDTM is hereby adopted by IGIAC as acceptable and preferred for state-wide GIS use.

Technical parameters of this system are:

1. Measurement unit: Meter
2. Central Meridian: 114 degrees West Longitude
3. Central Meridian scale factor: 0.9996
4. Horizontal Datum: NAD 1927 (until NAD '83 is adopted)
5. Latitude of Origin: 42 degrees North
6. False Northing at origin: 100,000 m
7. False Easting at origin: 500,000 m

## LIST OF 1994 IGIAC ANNUAL CONFERENCE ATTENDEES

Roger Kassens	Idaho Transportation Department	(208)-334-8224
Doug Richards	Bureau of Disaster Services	(208) 334-3460
Chuck Spencer	Ada County Highway District	(208) 345-7635
James Long	Idaho Public Utilities Commission	(208) 334-0364
Mike Dress	BLM-GCDB	(208) 384-3149
Andy Little	Power Engineering	(208) 378-6303
Scott Fahey	Idaho Department of Parks & Recreation	(208) 334-4180 X251
Lee Brooks	USDA-Natural Resource Conservation Service	(208) 334-1610
Marsha Weil	Holladay Engineering-Payette	(208) 642-3304
Sandy March	U.S.F.S. Sawtooth N.F.	(208) 737-3243
Gary Stevens	BLM	(208) 384-3105
Diane Holloran	Ada County Highway District	(208) 345-7635
Mike Beaty	U.S. Bureau of Reclamation	(208) 378-5172
Bob Wagner	U.S. Forest Service-Challis	(208) 879-2285 X624
Kathleen K. Walker	Potlatch Corporation-Lewiston	(208) 799-1181
Frank Mynar	Idaho Power Co.	(208) 388-2977
Molly Maupin	USGS-WRD	(208) 387-1307
Roni Gehring-Pratt	Ada Planning Association	(208) 345-5274
Joe Bucher	Ada Planning Association	(208) 345-5274
Dave Wood	Ada County Association	(208) 364-2396
John Bile	Ada County	(208) 364-2398
Gary Roloff	Boise Cascade Corp.	(208) 384-7761
Bruce Carroll	Boise Cascade Corp.	(208) 384-7654
Doug Kimmel	BLM	(208) 384-3141
Paul Castelin	Idaho Assoc. of Professional Geologists	(208) 327-7900
Matthew Gubitosa	EPA Region 10-Seattle	(206) 553-4059
John Steffenson	USFS-Portland	(503) 326-2294
Clyde G. Weller	USFS-Missoula	(406) 329-3173
Bill Cameron	USFS-Missoula	(406) 329-3569
Deb Hennessey	USFS	(208) 364-4395
William E. Hopkins	Infotech	(208) 344-7631
Dennis Baird	University of Idaho Library-Moscow	(208) 885-7552
Jeff Servatius	Ada County Assessor's Office	(208) 364-2397
Hal Anderson	Idaho Department of Water Resources	(208) 327-7900
Dave Gruenhagen	Idaho Department of Lands	(208) 334-0277
Byron Cochrane	Idaho Department of Lands	(208) 334-0271
Jim Moore	Idaho Department of Lands	(208) 334-0265
Shawn Rux	Boise Cascade Corp.	(208) 384-7988
Wayne Wold	Boise Cascade Corp.	(208) 384-6368
Greg Carson	Boise Cascade Corp.	(208) 384-7639
Roger North	Idaho Transportation Department	(208) 334-8223
Ron Cole	Idaho Transportation Department	(208) 334-8159
Luke White	INEL-Lockheed--Idaho Falls	(208) 526-1036

Julie Brizzee	INEL-Lockheed--Idaho Falls	(208) 526-8440
Ingrid Landgraf	USGS-National Mapping Division--Denver	(303) 236-5835
Milford Miller	Idaho Transportation Department	(208) 334-8475
John Courtright	Division of Environmental Quality	(208) 334-0502
Denny Rafferty	USFS	(208) 364-4138
Liza Fox	USFS-Nez Perce N.F.--Grangeville	(208) 983-1950
Bill Yeager	BLM	(208) 384-3108
Robert Smith	Idaho Department of Lands	(208) 334-0371
Luciel Vincent	Idaho State Tax Commission	(208) 334-7750
Rose Blazicevich	Idaho State Tax Commission	(208) 334-7750
Harold Short	U.S. Bureau of Reclamation-Burley	(208) 678-0461
Chris Ketchum	U.S. Bureau of Reclamation-Burley	(208) 678-0461
Pamela Lyon	Natural Resources Conservation Service	(208) 334-1525
Bill Kramber	Idaho Department of Water Resources	(208) 327-7996
Brad Holt	Boise Cascade Corp.	(208) 384-7632
Ted Martin	Canyon County Assessor-Caldwell	(208) 465-7279
Ginny Farr	BLM	(208) 384-3124
Mike Candelaria	BLM	(208) 384-3109
Sam Stoltz	Idaho Department of Lands	(208) 334-0271
Joe Spinazola	USGS-WRD	(208) 387-1390
Jeff Allred	Scientech	(208) 345-6788
Dennis Hill	City of Pocatello	(208) 234-6230
Dave Wood	Ada County Association	(208) 364-2396
Randall Sounhein	Panhandle Health District-Coeur d' Alene	(208) 667-9513
Troy Bunch	BLM	(208) 384-3116
Carol Silvers	Idaho State Library	(208) 334-7255
Chuck Dodson	BLM	(208) 362-1709
M. G. Day	USFS-Payette N.F.--McCall	(208) 253-0125
Tana Dace	Idaho Department of Water Resources	(208) 327-7861
Jeff Mork	BLM	(208) 384-3110
Nickie Duff	Ada County GIS	(208) 364-2314
Jack Clark	Idaho Assoc. of Land Surveyors/Infotech	(208) 344-7631
Terri Raynor	Ada Planning Association	(208) 345-5274
Dick Foster	USFS-New Meadows	(208) 347-2141
John Bice	Ada County	(208) 364-2316
Ray Miller		(208) 375-6155
Bob Vogler	U.S. Bureau of Reclamation	(208) 378-5196
Kris Gildesgaard	Ada County Highway District	(208) 345-7635
Patrick Frischmuth	Bureau of Disaster Services	(208) 334-3460
Peter Shimkus	Power Engineers-Hailey	(208) 788-0398
Jody South	CH2M Hill	(208) 345-5314 X309
Mike Butler	Idaho Power Co.	(208) 388-2948
Steve Garcia	USGS-WRD	(208) 387-1315
David Hoover	USDA-NRCS	(208) 334-1525
Alan Westphal	USDA-NRCS	(208) 334-1525

Dick Palmer	Idaho Transportation Dept.	(208) 334-8222
Doug Noltemeier	Idaho Department of Lands	(208) 334-0271
Gail Ewart	Division of Environmental Quality	(208) 334-5871
Robert Harmon	Id. Department of Water Resources	(208) 327-7995
Linda Davis	Id. Department of Water Resources	(208) 327-7998
Terry Bartlett	ESRI-Olympia	(206) 754-4723
Tony Morse	Id. Department of Water Resources	(208) 327-7997
Loudon Stanford	Idaho Geological Survey-Moscow	(208) 885-7479
Dennis Peters	U.S. Fish & Wildlife Service-Portland	(503) 231-6154
Larry Jones	Idaho State Historical Society	(208) 334-3356

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